Appendix A

Testing Procedures and Measurement Frequency/Protocol

Appendix A

Testing Procedures and Measurement Frequency/Protocol

Table A-1. Measurements for cold bench-scale tests—chemical oxidation.

Measurement/Observation	Traceability to Test Objectives	Matrix	Sample Frequency	Sample Location	Proposed Method
Weight of reaction flask	TO 2	N/A	Before test	Reaction flask	Balance
Weight of surrogate components	TO 2	Liquid/solid	Before addition to reaction flask	Weighing paper/bottle	Balance
VOCs in surrogate	TO 2	Surrogate emulsion	After surrogate is generated	Surrogate storage container	Gravimetric determination
SVOCs in surrogate	TO 2	Surrogate emulsion	After each batch of surrogate is generated	Surrogate storage container	Gravimetric determination
PCBs in surrogate	TO 2	Surrogate emulsion	After each batch of surrogate is generated	Surrogate storage container	Gravimetric determination
Metals in surrogate	TO 2	Surrogate emulsion	After each batch of surrogate is generated	Surrogate storage container	Gravimetric determination
Mercury in surrogate	TO 2	Surrogate emulsion	After each batch of surrogate is generated	Surrogate storage container	Gravimetric determination
Initial volume of surrogate	TO 2	Surrogate emulsion	Before test	Reaction flask	Graduated cylinder
Initial weight of surrogate	TO 2	Surrogate emulsion	Before test	Reaction flask	Balance
Temperature of fluid bath/ temperature of fluid entering flask jacket	TO 3	Liquid	Every 15 minutes during test	Fluid bath readout/thermometer in fluid bath	Thermometer
Temperature of water exiting flask jacket	TO 3	Liquid	Every 15 minutes during test	Exit of flask fluid jacket at return to bath	Thermometer
Flow rate of fluid circulating through jacket	TO 3	Liquid	Before each test	Fluid exiting flask into bath	Graduate cylinder/stopwatch
Temperature of cooling water at reflux condenser inlet	TO 3	Liquid	Every 15 minutes during test	Reflux condenser inlet	Thermometer

Table A-1. (continued).

Measurement/Observation	Traceability to Test Objectives	Matrix	Sample Frequency	Sample Location	Proposed Method
Temperature of cooling water at reflux condenser outlet	TO 3	Liquid	Every 15 minutes during test	Reflux condenser outlet	Thermometer
Flow through reflux condenser	TO 3	Liquid	Before each test	Fluid exiting fluid bath	Graduate cylinder/stopwatch
pH in reaction flask	TO 10	Surrogate emulsion	While adding acid to adjust pH, every 5 minutes during test duration, every minute during excursions	Two probes in reaction flask	pH meter
Temperature in reaction flask	TO 10	Surrogate emulsion	While adding acid to adjust pH, every 5 minutes during test duration, every minute during excursions	Two probes in reaction flask	Thermistor in pH meter
Chloride ion	TO 10	Surrogate emulsion	End of test	Reaction flask	ISE for chloride
Oxidizer flow rate	TO 2, TO 7, TO 8	Liquid	Every 15 minutes during test	Syringe pump	Syringe pump readout
Time interval for each oxidizer flow rate change	TO 2, TO 7, TO 8	N/A	Each time oxidizer flow rate changes	Laboratory clock	Difference in time from interval start to finish
Additions of other reagents to reaction flask (pH adjusters/catalysts, etc.)	TO 2	Liquid/solid	Before every addition, determine weight added.	Transfer container	Balance
Noncondensable gas flow rate at outlet of Dewar condenser	TO 4, TO 9	Gas	Every 10 minutes during test	Bubble meter at apparatus outlet	Bubble meters and mass flow meter
Gas at outlet of Dewar condenser	TO 4, TO 9	Gas	Every 10 minutes during test	Bubble meter at apparatus outlet	Thermocouple
Barometric pressure	TO 3	Air	Daily during testing	Laboratory barometer	Barometer
Ambient temperature	TO 3	Air	Daily during testing	Laboratory thermometer	Thermometer

Table A-1. (continued).

Measurement/Observation	Traceability to Test Objectives	Matrix	Sample Frequency	Sample Location	Proposed Method
Gas composition	TO 4, TO 9	Gas	Every 15 minutes during test or more frequently, if possible	Septum at outlet of reflux condenser	EPA Method 18 GC/TCD or GC/MS
Noncondensable gas composition	TO 4, TO 9	Gas	Every 15 minutes during test	Septum at outlet of Dewar condenser	EPA Method 18 GC/TCD or GC/MS
Time to complete test	TO 2, TO 7	N/A	Record the time of test start and finish.	Laboratory clock	Difference in time to nearest minute
Final weight of condensate	TO 4, TO 9	Liquid	After test	Condenser receiving flask	Gravimetric determination
Final weight of surrogate reaction products	TO 2, TO 7	Reacted surrogate	After test	Reaction flask contents	Gravimetric determination
Final volume of surrogate reaction products	TO 2, TO 7	Reacted surrogate	After test	Reaction flask contents	Graduated cylinder
VOCs in surrogate reaction products	TO 2, TO 7	Reacted surrogate	After test	Reaction flask	SW-846 8260B
SVOCs in surrogate reaction products	TO 2, TO 7	Reacted surrogate	After test	Reaction flask	SW-846 8270C
PCBs in surrogate reaction products	TO 2, TO 7	Reacted surrogate	After test	Reaction flask	SW-846 8082
Metals in surrogate reaction products	TO 2, TO 7	Reacted surrogate from definitive runs	After test	Reaction flask	SW-846 3050B and 6010B
Mercury in surrogate reaction products	TO 2, TO 7	Reacted surrogate	After test	Reaction flask	SW-846 7470
DRE	TO 2, TO 7, overall objective	N/A	After test	N/A	Calculation from initial and final concentrations of CFTs
Condensate composition	TO 4, TO 9	Condensate	After test	Condenser receiving flask	SW-846 8260B
Weight of reaction flask	TO 2	N/A	After decanting contents of flask	Reaction flask after test	Gravimetric determination

Table A-2. Measurements for corrosion tests.

Measurement/Observation	Traceability to Test Objectives	Matrix	Sample Frequency	Sample Location	Proposed Method
Initial weight of coupon	TO 5	Solid	Before adding to reaction flask	Material coupons	Gravimetric determination
Final weight of coupon	TO 5	Solid	After corrosion test	Material coupons	Gravimetric determination
Visual inspection/photographing coupons	TO 5	Solid	Before/after corrosion test	Material coupons	Visual

Table A-3. Measurements for bench-scale cold tests—stabilization of reaction products.

Measurement/Observation	Traceability to Test Objectives	Matrix	Sample Frequency	Sample Location	Proposed Method
Storage/cure temperature	LDR achievement	Stabilized, reacted surrogate	Daily during cure time	Water bath	Water bath/thermometer
Storage/cure time	LDR achievement	Stabilized, reacted surrogate	Elapsed time for curing	Laboratory clock	Laboratory clock
Ratio of waste to grout	LDR achievement	Stabilized, reacted surrogate	While preparing stabilized, reacted product	Grout mixing container	Gravimetric determination/calculation
TCLP Metals (Cr and Hg)	UTS for disposal	Stabilized, reacted surrogate	After 7-day cure	Cured grout	SW-846 1311
Paint filter test	ICDF waste acceptance criteria	Stabilized, reacted surrogate from definitive runs	After 30-day cure	Cured grout	SW-846 9095
Compressive strength	ICDF waste acceptance criteria	Stabilized, reacted surrogate from definitive runs	After 30-day cure	Cured grout	Handheld penetrometer

CFT = contaminant for treatment.
DO = dissolved oxygen.
DRE = destruction and removal efficiency.
EPA = U.S. Environmental Protection Agency.
GC = gas chromatograph.
ICDF = INEEL CERCLA Disposal Facility.
ISE = ion selective electrode.
LDR = land disposal restriction.
MS = mass spectrometer.
PCB = polychlorinated biphenyl.
SVOC = semivolatile organic compound.
TCD = thermal conductivity detector.
TCLP = toxicity characteristic leaching procedure.
TO = test objective.
UTS = universal treatment standard.
VOC = volatile organic compound.

Appendix B

Computational Methods and Examples

Appendix B

Computational Methods and Examples

TO 2: Determine Conversion Extent of CFT Destruction

The conversion of the contaminants for treatment (CFTs) is only partially determined by the data available from the test results. DRE, destruction-removal efficiency, is easily determined, although not with a high degree of precision, by comparing the mass of each CFT in the product slurry with that charged to the reaction flask.

For example, in Run F9a, the CFTs are trichloroethylene (TCE) tetrachloroethylene (PCE), trichloroethane (TCA), bis-ethylhexylphthalate (BEHP), hexachlorobenzene (HCB), and biphenyl (BP). Hexachlorobenzene and biphenyl are substitutes for Arochlor 1260 in most of the runs; however, in the final formal runs Arochlor is added to the reaction flask, also.

As calculated in the Excel spreadsheet used to enumerate the results of each formal test (surrogateSTK.xls), the formula for DRE calculation is:

$$DRE = 100\% \, (1 - M_{CFTf} / M_{CFT\,i})$$

$M_{CFT\,f}$ is the mass of the compound in the products of the reaction. The mass is determined by the concentration of compound as analyzed by BWXT and by the mass of the product slurry as measured by MSE Technology personnel:

$$M_{CFT\,f} = [\ CFT\ ]\ M_f / (1{,}000\ gm/kg)$$

The concentration of the contaminant of concern, [CFT], is in units of milligram of compound per kilogram of final product (mg/kg) in the Excel spreadsheet. The mass of the product slurry, M_f, is in grams. The reported quantity of the CFT is in units of total milligram in the product slurry.

$M_{CFT\,i}$ is the amount of the compound charged to the reaction flask. Each volatile and semivolatile compound that is charged to the reaction flask is weighed on an analytical balance using weighing paper, weighing boats or microliter syringes.

The DRE determination for each CFT is then based on the weight charged to the reaction flask, the final product weight and the analysis of the compound (ppm_w) in the product slurry. The equation expressing this result is, then:

$$DRE = 100\% \, \{1 - ([CFT]\ M_f / (1{,}000\ gm/kg)) / M_{CFT\,i}\}$$

For semivolatile compounds, the above equation calculates both the DRE and percent conversion of the compound during the course of reaction. For volatile compounds, the equation calculates the DRE, but, not necessarily, the conversion by reaction. Conversion of volatile compounds has to take into account the loss of volatiles from the reaction flask by volatilization.

Test MV, the method validation test, reported DREs for TCE of 99.98%, for PCE of 99.6% and for TCA of 99.7%. The method validation test heated the standard reaction flask charge to 80°C for 8 hr. No peroxide was added to the flask during Test MV; oxygen was bubbled through the flask at about 200 accm.

Test MV showed that the volatile compounds would leave the reactor, and that DRE essentially consists of volatilization. The sparse GC/MS results available for runs F-6 (40°C, 500 mL H_2O_2) and F-13 (40°C, 400 mL H_2O_2, 12 hr) and F-21 (80°, 250 mL H_2O_2, 8 hr) indicate that the volatiles occur at low, consistent concentrations in the off-gas throughout the 40°C runs; but appear in high concentrations early in the 80°C test and diminish rapidly as the run proceeds.

Uncertainty Analysis

For a result "r," calculated by a function such as r = r(x, y, z), the general method for determining uncertainty in the result is[a]:

$$[U_r]^2 = [(\partial r/\partial x)\, U_x]^2 + [(\partial r/\partial y)\, U_y]^2 + [(\partial r/\partial z)\, U_z]^2$$

Where U_r is the uncertainty in the result and U_x, U_y and U_z are the respective uncertainties in the independent variables.

The equation for the DRE is rewritten below to facilitate error analysis:

$$1 - DRE = ([CFT]\, M_f / (1{,}000\ gm/kg)) / M_{CFT\,i}$$

The partial derivatives for the right hand term are:

$$(\partial[1 - DRE] / \partial[CFT]) = M_f / (1{,}000\ gm/kg)) / M_{CFT\,i}$$

$$(\partial[1 - DRE] / \partial M_f) = ([CFT] / (1{,}000\ gm/kg)) / M_{CFT\,i}$$

$$(\partial(1 - DRE) / \partial M_{CFT\,i}) = -(M_f [CFT] / (1{,}000\ gm/kg)) / (M_{CFT\,i})^2$$

The uncertainty equation then becomes:

$$U^2_{(1-DRE)} = \{U_{[CFT]} / M_f / (1{,}000\ gm/kg)) / M_{CFT\,I}\}^2 + \{U_{M_f} / ([CFT] / (1{,}000\ gm/kg)) / M_{CFT\,i}\}^2 + \{M_{CFT\,I})^2\}^2$$

Dividing through the left hand side of the uncertainty equation by:

$$[1 - DRE]^2$$

and the right hand side by:

$$\{[CFT]\, M_f / (1{,}000\ gm/kg)) / M_{CFT\,i}\}^2$$

simplifies the expression to:

$$\{U_{(1-DRE)} / (1 - DRE)\}^2 = \{U_{[CFT]} / [CFT]\}^2 + \{U_{M_f} / M_f\}^2 + \{M_{CFT\,I} / M_{CFT\,I}\}^2$$

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a. *Experimentation and Uncertainty Analysis for Engineers*; Hugh W. Coleman, W. Glen Steele, Jr.; John Wiley and Sons; 1989.

The above-simplified form of the uncertainty equation will be used for the succeeding sections of this report without derivation.

The following are the estimated uncertainties of the independent variables:

$U_{[CFT]}/[CFT] = \pm 20\% = 0.2$

$U_{Mf} = \pm 0.1$ g/2

$M_f = 619.4$ g [test F-16 (80°, 500 mL H_2O_2, 12 hr)]

$U_{Mf}/M_f = \pm 0.05/619.4 = 80.7$ E-6

$U_{M\,CFT\,I} = \pm 0.0001$ g/2

$M_{CFT\,I} = \pm 0.1656$ (TCE, test F-16)

$U_{M\,CFT\,I} / M_{CFT\,I} = \pm 0.00005 / .1656 = 302$ E-6

$\{U_{(1-DRE)}/ (1 - DRE)\}^2 = \{0.2\}^2 + \{ 80.7 \text{ E-6}\}^2 + \{302 \text{ E-6}\}^2 = 40.0$ E-3 $= 0.04$

$\{U_{(1-DRE)}/ (1 - DRE)\} = (0.04)^{0.5} = 0.2 = 20\%$

The final estimate of the uncertainty of the DRE calculation pretty much shows that the entire uncertainty is due to the uncertainty of the chemical analyses, or about ± 20%.

TO 3: Estimate the Rate of Heat Generation

In order for the contents of the reaction flask to stay at a steady temperature, heat generated by reaction, and heat added by the silicon oil, has to be lost through the reflux condenser and the glass surface of the flask. The energy of the flask contents is also slightly affected by the enthalpy of the peroxide stream entering the flask, and the enthalpy of the vapor stream leaving it.

The following defines the variables used in determining the heat balance:

ΔHg: heat generated by reaction in the flask in calories per minute;

ΔHo: enthalpy lost by the silicone oil as it is pumped through the flask;

ΔHcw: enthalpy gained by the condenser water in calories per minute;

ΔHp: enthalpy gained by the peroxide entering the flask;

ΔHog: enthalpy of the gas leaving the reflux condenser;

Qc: heat lost by the gas as it transits the reflux condenser;

Qtt: total heat lost by the flask through its surface.

Qtc: convective heat loss from the top, unjacketed half of the flask;

Qbc: convective heat loss from the bottom-jacketed-half of the flask;

Qtr: radiative heat loss from the top of the flask;

Qbr: radiative heat loss from the bottom of the flask;

Ta: ambient room temperature;

Toi: silicone oil temperature from the oil heater;

Tor: silicone oil return temperature;

Tci: condenser water inlet temperature;

Tcr: condenser water return temperature;

Tt: flask top half surface temperature;

Tb: flask bottom half surface temperature.

Mo: silicone oil flow rate;

Mc: condenser water flow rate;

Mp: peroxide flow rate;

Mog: reflux exit gas flow rate;

Yog: volume percent water vapor in the reflux exit gas;

Cw: water specific heat;

Co: silicone oil specific heat;

ΔH_{H2O}: latent heat of water vaporization.

The following equates the energy generated by reaction, and the energy transferred into the flask by the silicone oil and by the hydrogen peroxide, to the energy lost by convection and radiation from the surface of the flask and by transport of vapor from the flask:

$$\Delta Hg + \Delta Ho + \Delta Hp = Qtt + Qc + \Delta Hog$$

The overall heat balance can be rewritten as:

$$\Delta Hg = -\Delta Ho - \Delta Hp + Qtt + Qc + \Delta Hog$$

The enthalpy change of the oil (ΔHo) is negative since the oil cools. The oil enthalpy change is calculated by:

$$\Delta Ho = Mo\ Co\ (Tor-Toi)$$

The enthalpy change of the condenser water (ΔHcw) is a positive number, since the water heats up. The condenser water enthalpy change is subtracted from the energy in the flask since it represents heat taken away from the flask, or, Qc = –ΔHcw. The heat taken away from the flask is due to cooling of the non-condensable gas formed by reaction and by condensing the water vaporized into the gas stream. For the purpose of this analysis, it is assumed that the gas will be saturated by water vapor as it exits the reflux condenser at the temperature indicated at sample port "P2" of the glassware apparatus (Figure 2-1). The amount of heat transferred to the condenser water is:

$$\Delta Hcw = Mc\ Cw\ (Tcr - Tci)$$

The exit gas from the reflux condenser has been cooled to the point of having near zero enthalpy; however, there is a certain fraction of water that has vaporized into it. The energy leaving the flask due to water evaporation is accounted for by:

$$\Delta Hog = Yog\ Mog\ \Delta H_{H2O} / 31.3\ g/gmol$$

An average molecular weight of 31.3 has been estimated for the exit gas, based on it being mostly oxygen with about 5% water vapor as its main constituents.

The total heat loss through the glass surface of the flask is equal to the convective loss and radiative losses from the top of the flask, which are a function of the surface temperature of the glass, and the corresponding losses through the outer surface of the heating jacket, which are a function of the surface temperature of that portion of the flask, or:

$$Qtt = Qtc + Qtr + Qbc + Qbr$$

Several approaches to estimating the heat loss from the flask were made. The method validation test that was run on 21 July included all components of the surrogate but no peroxide injection; thus, any heat added to the system by the silicone oil had to be lost through the reflux condenser and glass surfaces of the flask. There should be no term for heat generation by reaction.

The upper and lower glass surface areas of the flask were estimated, and convection and radiation equations written to attempt to correlate the losses. Mathcad was used to estimate the losses. The Mathcad calculations used the surface temperatures of the flask and the ambient air temperature to estimate the heat losses. The convective heat transfer coefficient was the only correlating variable.

The heat loss equations were added to the Excel spreadsheet used to reduce the run data. It was eventually determined that a value of the convective coefficient of about 2.75 Btu/hr/ft^2/°F provided a near fit to the data from the final few tests.

On the 7th and 12th of August, further attempts were made to correlate the heat loss from the reaction flask. In these tests, 500 mL of water was placed in the flask and the silicone oil used to heat it. The water to the reflux condenser cooled any resulting vapor.

The data from the heat loss runs were correlated with a linear least squares program against both oil bath temperature (Toi) and oil bath temperature minus ambient temperature (Toi – Ta). Both correlated with an r = 0.99.

The resulting correlations were:

Qtt = 66.48 (Toi – Ta) – 411.25 cal/min, with T in °C

Qtt = 66.52 Toi – 2324.54 cal/min

At 100°C oil temperature and 25°C ambient temperature, the above correlations predict a heat loss of 4,330 and 4,570 calories per minute, respectively.

The heat losses from the correlations were used to find a heat transfer coefficient for Run F16 that would match the heat losses from the glassware in the heat loss tests. The average heat transfer coefficient for F-16 was 2.74.

Uncertainty Analysis

The uncertainty analysis for the generation of energy by the reaction system follows the method explained above. For the heat transferred to the flask by the silicone oil:

1. $\Delta Ho = Mo\ Co\ (Tor-Toi)$

the uncertainty equation becomes:

$[U\Delta Ho / \Delta Ho]^2 =$

$[U_{Mo} / Mo]^2 + [U_{Co} / Co]^2 + [U_{Tor} / (Tor-Toi)]^2 + [U_{Toi} / (Tor-Toi)]^2$

For Run F-16 (80°C, 500 mL H_2O_2, 12 hr), the estimated values of uncertainty and values of the variables are:

U_{Mo} / Mo = (5 mL/min) / 621 (mL/min)

U_{Co} / Co = (0.15 cal/g/°C) / (0.4 cal/g/°C)

U_{Tor} / (Tor-Toi) = (3°C) / (19.2°C)

U_{Toi} / (Tor-Toi) = (0.5°C) / (19.2°C)

The above values give an uncertainty of the heat transferred from the oil of:

$[U\Delta Ho / \Delta Ho] = 0.408 = 41\%$

The major uncertainty, as can be seen above, is in the heat capacity of the silicone oil. All the company contacts and literature inspected to date has not shed light on the heat capacity at temperatures around 80 to 100°C for the BOSS DS fluid used in the constant temperature bath. Further work along this topic requires that we replace the BOSS oil with one that has documented physical properties.

2. $\Delta Hcw = Mc\ Cw\ (Tcr - Tci)$

The heat capacity of water, Cw, is a known quantity, so the uncertainty equation need not address it, and becomes:

$$[U\Delta_{Hcw} / \Delta Hcw]^2 = [U_{Mc} / Mc]^2 + [U_{Tcr} / (Tcr - Tci)]^2 + [U_{Tci} / (Tcr - Tci)]^2$$

$$[U_{Mc} / Mc] = (5\ mL/min) / (1{,}069\ mL / min)$$

$$[U_{Tcr} / (Tcr - Tci)] = (0.5°C) / (1.9°C)$$

$$[U_{Tci} / (Tcr - Tci)] = (0.5°C) / (1.9°C)$$

the estimate of the uncertainty involved in the heat transferred to the reflux condenser is:

$$[U\Delta_{Hcw} / \Delta Hcw] = 37\%$$

This uncertainty is due to the very low temperature difference of the cooling water caused by the condenser being pinched because of concurrent flow.

3. $\Delta Hp = Mp\ C\ (Ta - Tr)$

The change in enthalpy of the peroxide is of the same form as the condenser water, so, by inspection, the uncertainty is:

$$[U_{\Delta Hp} / \Delta Hp]^2 = [U_{Mp} / Mp]^2 + [U_{Ta} / (Ta - Tr)]^2 + [U_{Tr} / (Tr - Ta)]^2$$

$$[U_{Mp} / Mp] = [0.001\ mL/min / 2\ mL/min]$$

$$[U_{Ta} / (Ta - Tr)] = [0.5°C / (91.5 - 25)°C]$$

$$[U_{Tr} / (Tr - Ta)] = [0.2°C / (91.5 - 25)°C]$$

$[U_{\Delta Hp} / \Delta Hp] = 2.38\ \%$

4. $\Delta Hog = Yog\ Mog\ \Delta H_{H2O} / 31.3\ g/gmol$

The latent heat of water is known, so the uncertainty equation becomes:

$$[U_{Hog} / Hog]^2 = [U_{Yog} / Yog]^2 + [U_{Mog} / Mog]^2$$

$$[U_{Yog} / Yog] = (0.4\ psia / 12.1\ psia) = 3.3\%$$

$$[U_{Mog} / Mog] = 2.4\%$$ (see the next section on TO-4)

$[U_{Hog} / Hog] = 4.1\%$

5. Qtt = Qtc + Qtr+ Qbc + Qbr

$Qtc = Uo\ A1\ (Ts - Ta)$

$[U_{Qtc} / Qtc]^2 = [U_{Uo} / Uo]^2 + [U_{A1} / A1]^2 + [U_{Ts} / (Ts - Ta)]^2 + [U_{Ta} / (Ts - Ta)]^2$

$[U_{Uo} / Uo] = (0.8\ Btu/hr/ft^2/°F) / (2.75\ Btu/hr/ft^2/°F) = .291 = 29\%$

$[U_{A1} / A1] = 15\%$

$[U_{Ts} / (Ts - Ta)] = (3°C / 48.9C°) = 6.1\%$

$[U_{Ta} / (Ts - Ta)] = (3°C / 48.9C°) = 6.1\%$

$[U_{Qtc} / Qtc] = 33.8\%$

The majority of the uncertainty in the quantity of heat lost by convection from the top of the flask is due to the uncertainty in the heat transfer coefficient and the uncertainty in the irregular area of the surface of the flask.

$Qtr = 0.1713\ \varepsilon\ A1\ [(Ts/100)^4 - (Ta/100)^4]$

$[U\ Qtr / Qtr]^2 = [U\ \varepsilon / \varepsilon]^2 + [U\ A1 / A1]^2$

$+ [(Uts/100)\ (Ts/100)^3 / [(Ts/100)^4 - (Ta/100)^4])]^2$

$+ [-(Uta/100)\ (Ts/100)^3 / [(Ts/100)^4 - (Ta/100)^4])]^2$

$[U\ \varepsilon / \varepsilon] = (0.05)$

$[U\ A1 / A1] = (0.15)$

$[(Uts/100)\ (Ts/100)^3 / [(Ts/100)^4 - (Ta/100)^4]] = 220\ E\text{-}6$

$[(Uta/100)\ (Ts/100)^3 / [(Ts/100)^4 - (Ta/100)^4]] = -65.5\ E\text{-}6$

$[U\ Qtr / Qtr] = 15.9\%$

The uncertainty of the transfer of heat from the flask by radiation is controlled by the uncertainty of the area estimate almost wholly.

The values for the bottom of the flask, Qbc and Qbr are assumed to be the same as those calculated for the top of the flask. Therefore, for:

$Qtt = Qtc + Qtr + Qbc + Qbr$

$[U_{Qtt} / Qtt]^2 = [U_{Qtc} / Qtc]^2 + [U_{Qtr} / Qbr]^2 + [U_{Qbc} / Qbc]^2 + [U_{Qbr} / Qbr]^2$

$[U_{Qtt} / Qtt] = 52.8\%$

6. $\mathbf{\Delta Hg = -\Delta Ho - \Delta Hp + Qtt + Qc + \Delta Hog}$

$[U_{\Delta Hg}/\Delta Hg]^2 =$

$[U_{\Delta Ho}/\Delta Ho]^2 + [U_{\Delta Hp}/\Delta Hp]^2 + [U_{Qtt}/Qtt]^2 + [U_{Qc}/Qc]^2 + [U_{\Delta Hog}/\Delta Hog]^2$

$[U_{\Delta Ho}/\Delta Ho] = 0.41$

$[U_{\Delta Hp}/\Delta Hp] = 0.023$

$[U_{Qtt}/Qtt] = 0.53$

$[U_{Qc}/Qc] = 0.37$

$[U_{\Delta Hog}/\Delta Hog]^2 = 0.041$

$\mathbf{[U_{\Delta Hg}/\Delta Hg] = 77\%}$

The analysis above forces the conclusion that we have virtually no certainty of the heat generated by reaction based on the method employed. The major components of uncertainty are the heat added by the oil (because of its unknown heat capacity), and the subsequent heat losses through the reflux condenser and the walls of the flask. The heat losses through the walls of the flask are not truly independent since these losses are calculated from the heat added by the oil and, therefore, are correlated to the heat added by the oil. Since the uncertainty of the heat lost is correlated to the heat added, the overall error above may be estimated high. However, there is no reason to further quantify the error since, as has been stated, the estimated heat generation rate is much greater than the heat that should be generated as calculated by thermodynamics. The only conclusion that can be drawn at this point is that the heat generated by reaction should be less than that measured in the current apparatus.

TO 4: Estimate the Bulk Gas Generation Rate

The bulk gas generation rate, Mog, defined as the reflux exit gas flow rate in the previous section, is determined using a "bubble-meter" and a stopwatch.

We use bubble meters graduated in 0 to 50 mL, or 0 to 10 mL, depending on the flow rate of gas from the reaction flask. If the volume measured is designated, Vog, and the time measured by the stopwatch is $\Delta\theta$, the grams per minute flowing from the reaction flask is calculated as:

$Mog = Vog\ \rho_{og} / \Delta\theta$

A density measurement, ρ_{og}, is required to convert the calculated accm to a mass flow rate. The ideal gas law is used along with the absolute pressure, room temperature and the estimated gas molecular weight. The Excel spreadsheet uses the measured or estimated gas composition to estimate the molecular weight. The final density equation is then:

$\rho_{og} = Pa\ Mw / (R\ Ta)$

with Pa and Ta indicating the absolute pressure and temperature, respectively, and R being the gas constant.

The mass flow equation is then, when put together:

$Mog = Vog\ Pa\ Mw_{og} / (R\ Ta\ \Delta\theta)$

The mass flow is a point value and is measured with the bubble meter every 15 min throughout each test run. To determine the total mass of gas from the reaction, each succeeding point value is averaged with the immediately previous point value and multiplied by the time interval between them. The calculated mass of gas between every 15 min time interval is then added to the previous sum to "integrate" the rate versus time curve.

Uncertainty Analysis

The reduced uncertainty equation is:

$Mog = Vog\ Pa\ Mw_{og} / (R\ Ta\ \Delta\theta)$

$[U_{Mog} / Mog]^2 = [U_{Vog}/ Vog]^2 + [U_{Pa}/ Pa]^2 + [U_{MWog}/ Mwog]^2 + [U_{TA}/TA]^2 + [U_{\Delta\theta} /\Delta\theta]^2$

The estimated uncertainties and absolute values from Run F-16 (80°C, 500 mL H_2O_2, 12 hr) are listed below:

$U_{Vog}/ Vog = 0.05$ mL/ 50 mL

$U_{Pa}/ Pa = 0.005$ psi / 12.08 psia

$U_{MWog}/ Mwog = (0.6$ g/gmol) / (31.3 g/gmol)

$U_{TA}/TA = 3C°$ / 293 K

$U_{\Delta\theta} /\Delta\theta = 0.02$ sec / 7.02 sec

The above numbers give an estimated uncertainty for the bulk gas generation rate of:

$U_{Mog} / Mog = \pm 2.4\%$

TO 9: Determine the Behavior of VOCs in the Off-gas

The mass of volatiles exiting the reaction flask through the off-gas is estimated by multiplying the volume fraction of the particular compound (as measured by GC/MS) by the molar flowrate of the offgas. This product is then multiplied by the molecular weight of the compound. The total mass of each compound is then calculated by integrating the point values as described above.

$M_{cft} = [\ CFT\ ]\ Mog\ Mw_{cft} / Mw_{og}$

Uncertainty Analysis

$$\{U_{M\,[CFT]} / [CFT]\}^2 = \{U_{\,[CFT]} / [CFT]\}^2 + [U_{\,Mog} / Mog]^2 + [U_{\,Mwog} / Mw_{og}]^2$$

$$\{U_{\,[CFT]} / [CFT]\}^2 = [0.4\,]^2$$

The other two values have been determined in the previous section, giving an overall uncertainty for VOCs in the off-gas of about,

$$\{U_{M[CFT]} / [CFT]\,\} = 40.1\%$$

Appendix C

Test Run Summaries

S Kujawa											
7/22/2003						**Reactor Charge**					
TEST RUN	**MV-1**										
			SURROGATE			**Target**				**Actual**	
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
	Charge:				150						
water					120.0442	120.04			**120.072**		
hydraulic oil					2.0938	2.38			**2.013**		
cutting oil					2.0938	2.38			**2.024**		
IsoOctane									**none**		
Al2O3					0.3349	0.08	83.9		**0.335**		
CaO					0.5413	0.16	163.0		**0.540**		
Cr2O3					0.2326	0.04	44.6		**0.231**		
Fe2O3					1.3032	0.44	435.1		**1.304**		
MgO					0.7269	0.38	375.9		**0.727**		
MnO					0.4254	0.08	82.1		**0.427**		
SiO2					8.3907	3.71	3712.7		**8.391**		
Na3PO4					12.2584	4.83	4831.8		**12.258**		
KOH					0.3224	0.16	157.8		**0.325**		
Hg					0.0516	0.00	3.8		0.0542		**4**
Aroclor-1260		Number of Vials:							**none**		
TCE					0.8431	0.58	577.5		**0.843**		
PCE					0.0747	0.05	45.8		**0.073**		
TCA					0.0941	0.07	70.2		**0.093**		
BEHP					0.1619	0.17	165.2		**0.130**		
	Total:				150.0	135.55			150		
			REAGENTS								
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
HCB					0.0056				**0.006**		
BP					0.0029				**0.003**		
FeSO4 7H2O					1.5				**1.499**		
H2O2 (50%)					0				**0**	**0**	
H2SO4 (con)									**11.898**		
NaOH (4 M)									**1.840**		
Oxygen:	Set Point:	**0.2**	lpm	Run Dur.:	481.0	Minutes			126		
	Total:				151.5				291		

	S Kujawa													
	7/23/2003					Gas Phase Data/Calculations								
	TEST RUN	**MV**												
	Results		**Gas Phase Calculations**											
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, F**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
12:04				T, P and Mw are dummy numbers				0						
12:05	50	14.88	202	87	12.2	31.3	0.065	0.210	1.0	0.105	0.105	0.1		76.8
12:10				87	12.2	31.3	0.065	0.000	5.0	0.105	0.526	0.6		76.8
12:20	50	29.25	103	87	12.2	31.3	0.065	0.107	10.0	0.053	0.535	1.2		76.8
12:35	50	25.75	117	87	12.2	31.3	0.065	0.122	15.0	0.114	1.714	2.9		78.5
12:50	50	14.72	204	87	12.2	31.3	0.065	0.213	15.0	0.167	2.506	5.4		78.9
13:05	50	16.22	185	87	12.2	31.3	0.065	0.193	15.0	0.203	3.041	8.4		79.5
13:20	50	15.72	191	87	12.2	31.3	0.065	0.199	15.0	0.196	2.940	11.4		79.6
13:35	50	15.75	190	87	12.2	31.3	0.065	0.199	15.0	0.199	2.983	14.4		80
13:50	50	16.07	187	87	12.2	31.3	0.065	0.195	15.0	0.197	2.951	17.3		80.4
14:05	50	16.62	181	87	12.2	31.3	0.065	0.188	15.0	0.192	2.873	20.2		80.6
14:20	5	17.47	17	87	12.2	31.3	0.065	0.018	15.0	0.103	1.547	21.7		80.8
14:35	50	16.37	183	87	12.2	31.3	0.065	0.191	15.0	0.105	1.568	23.3		79.9
14:50	50	23.44	128	87	12.2	31.3	0.065	0.134	15.0	0.162	2.435	25.7		80.3
15:05	50	24.6	122	87	12.2	31.3	0.065	0.127	15.0	0.130	1.955	27.7		80.7
15:20	10	11.63	52	87	12.2	31.3	0.065	0.054	15.0	0.091	1.358	29.0		80.3
15:35	20	21.35	56	87	12.2	31.3	0.065	0.059	15.0	0.056	0.843	29.9		80.7
15:50	50	24.44	123	87	12.2	31.3	0.065	0.128	15.0	0.093	1.400	31.3		80.3
16:05	50	20.87	144	87	12.2	31.3	0.065	0.150	15.0	0.139	2.085	33.4		80.5
16:20	10	19.15	31	87	12.2	31.3	0.065	0.033	15.0	0.091	1.370	34.7		80.5
16:35	50	20.75	145	87	12.2	31.3	0.065	0.151	15.0	0.092	1.376	36.1		80.4
16:50	50	30.06	100	87	12.2	31.3	0.065	0.104	15.0	0.127	1.912	38.0		80.4
17:05	0			87	12.2	31.3	0.065	0.000	15.0	0.052	0.781	38.8		81
17:20	0			87	12.2	31.3	0.065	0.000	15.0	0.000	0.000	38.8		81
17:35	20	18.18	66	87	12.2	31.3	0.065	0.069	15.0	0.034	0.516	39.3		81
17:50	0	16.69	0	87	12.2	31.3	0.065	0.000	15.0	0.034	0.516	39.8		80.6
18:05				87	12.2	31.3	0.065	0.000	15.0	0.000	0.000	39.8		80.4
18:20	50	21.13	142	87	12.2	31.3	0.065	0.148	15.0	0.074	1.111	40.9		80.5
18:35	50	31.38	96	87	12.2	31.3	0.065	0.100	15.0	0.124	1.859	42.8		79.8
18:50	50	31.53	95	87	12.2	31.3	0.065	0.099	15.0	0.099	1.492	44.3		80.3
19:05	50	25.22	119	87	12.2	31.3	0.065	0.124	15.0	0.112	1.675	46.0		80.6
19:20				87	12.2	31.3	0.065	0.000	15.0	0.062	0.931	46.9		80.6
19:35	50	20.34	147	87	12.2	31.3	0.065	0.154	15.0	0.077	1.154	48.1		78.9
19:50	50	16.62	181	87	12.2	31.3	0.065	0.188	15.0	0.171	2.566	50.6		79
20:05	50	17.62	170	87	12.2	31.3	0.065	0.178	15.0	0.183	2.744	53.4		78.4
								0.106	481.0			51.2		79.9
	the percents and PPMv below are dummy numbers pending GC/MS results													
Run Time	**% O2**	**% CO2**	**% H2O**	**% CO**	**PPMv TCE**	**PPMv PCE**	**PPMv TCA**	**MW**						
12:05	95%	0%	5%	0%	5	5	5	31.3						

S Kujawa									
7/22/2003				**Test Results**					
TEST RUN	**MV-1**								
	Results					Str RPM:	**372**		
	Product slurry Sp. Gr.:	1.13							
	Final Product Slurry, ml:	**129**							
	Final Product Slurry, gm:	**146.1**							
	Dewar Flask net wt., gm	**0.007**							
	Liquid/slurry Product, gm:	146.1		(Slurry Wt, 100% H2O2/O2 RXN):	291				
	Product Gas Weight, gm:	53.4							
	Product Wt, gm:	199.5							
	Total Charge Weight, gm:	**291**							
	Overall Mass Balance								
	Mass Balance Closure:	68.6%							
	Mass balance w/o gas:	89%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene			HexachloroBenzene					
	Slurry analysis, 1, mg/kg:	2.00	U						
	Slurry analysis, 2, mg/kg:	0.219	J						
	Avg., mg/kg	1.110		slurry ,mg:	tbd				
	Total, mg:	0.162							
	TCE, DRE, %	99.98%		HCB, DRE, %	#VALUE!				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	2.00	U						
	Slurry analysis, 2, mg/kg:	1.96	U						
	Avg., mg/kg	1.980		slurry ,mg:	tbd				
	Total, mg:	0.289							
	PCE, DRE, %	99.6%		BP, DRE, %	#VALUE!		Run time:	8.0	Hours
							Run Temp:	79.9	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	0	ml
	Slurry analysis, 1, mg/kg:	2.00	U						
	Slurry analysis, 2, mg/kg:	1.96	U						
	Avg., mg/kg	1.980		slurry ,mg:					
	Total, mg:	0.289							
	TCA, DRE, %	99.7%		Aroclor, DRE, %	#VALUE!				
	BEHP								
	Slurry analysis, 1, mg/kg:								
	Slurry analysis, 2, mg/kg:			Semivolatile samples destroyed in shipping					
	Avg., mg/kg	#DIV/0!							
	Total, mg:	#DIV/0!							
	BEHP, DRE, %	#DIV/0!							

S Kujawa				**Heat Balance**					
7/28/2003									
TEST RUN	**MV**								
							numbers in red are questionable.		
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**				
Time				Boss DS oil density, gm/ml	0.844				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
note	Water Return Temp, Deg F	**50**		Oil Return Temp, Deg C	**74.6**				
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**29.9**		Bucket ck time, sec	**8.63**				
	Flow rate, ml/min	2007		Flow rate, ml/min	695				
	Enthalpy change, calorie/min:	10033		Enthalpy change, calorie/min:	-5962				
	Flask Top Surface Temp., F	165		Flask bottom Surface Temp., F	169				
	Air Temp. ,F	87		Air Temp. ,F	87				
	Overall HT coef. Btu/hr/F/sq ft	0		Overall HT coef.	0				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	0		Convective Loss, cal/min	0				
	Radiative Loss, cal/min	557		Radiative Loss, cal/min	834				
	Flask top Heat Loss, cal/min	557		Flask bottom Heat Loss, cal/min	834				
	Reactor Temperature, C	**80**		P1 Gas Temp. Deg C.	31				
	Peroxide Temperature, F	70		Gas Flow Rate, gm/min	0.106				
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0031				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	1.73				
	Peroxide Enthalpy Change, cal/m	0.0							
				Accumulation/Generation, cal/min	-5464				
	8/8/2003:								
	All heat transfer calculations are to be considered incorrect due to uncertainty of the								
	condenser water flow rates during the runs through run F-6.								

S Kujawa											
8/6/2003					**Reactor Charge**						
TEST RUN	**F-6**										
			SURROGATE			**Target**				**Actual**	
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
	Charge:				150						
water					120.0442	120.04			**120.371**		
hydraulic oil					2.0938	2.38			**2.059**		
cutting oil					2.0938	2.38			**2.134**		
Al2O3					0.3349	0.08	83.9		**0.3353**		
CaO					0.5413	0.16	163.0		**0.5409**		
Cr2O3					0.2326	0.04	44.6		**0.2333**		
Fe2O3					1.3032	0.44	435.1		**1.3031**		
MgO					0.7269	0.38	375.9		**0.7271**		
MnO					0.4254	0.08	82.1		**0.4251**		
SiO2					8.3907	3.71	3712.7		**8.3911**		
Na3PO4					12.2584	4.83	4831.8		**12.2578**		
KOH					0.3224	0.16	157.8		**0.3223**		
Hg					0.0516	0.00	3.8		**0.0715**		4
Aroclor-1260									**none**		
TCE					0.8431	0.58	577.5		**0.8570**	TCE	
PCE					0.0747	0.05	45.8		**0.0804**	PCE	
TCA					0.0941	0.07	70.2		**0.0954**	TCA	
BEHP					0.1619	0.17	165.2		**0.1690**	BEHP	170
	Total:				150.0	135.55			150.4		
			REAGENTS								
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
HCB					0.0056				**0.0064**	HCB	
BP					0.0029				**0.0031**	BP	
FeSO4 7H2O					1.5				**1.5005**		
H2O2 (50%)					600	500			600	**500**	
H2SO4 (con)									**11.6605**		
NaOH (4 M)									**3.457**		
	Total:				751.5				767.0		

	S Kujawa													
	8/6/2003													
	TEST RUN	**F-6**												
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, C**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
9:45	**0**	1	0	**21**	**12.04**	31.4	0.067	0.000		0.000	0.000	0.0		**43.8**
9:50	**0**	1	0	**21**	**12.04**	31.4	0.067	0.000	5.0	0.000	0.000	0.0		**43.7**
10:00	**0**	1	0	**21**	**12.04**	31.5	0.067	0.000	10.0	0.000	0.000	0.0		**43.7**
10:15	**3**	**12.22**	15	**22**	**12.04**	31.5	0.067	0.016	15.0	0.008	0.118	0.1		**44**
10:30	**3**	**10.43**	17	**23.5**	**12.04**	31.5	0.066	0.018	15.0	0.017	0.255	0.4		**44.2**
10:45	**3**	**23.63**	8	**24**	**12.04**	31.5	0.066	0.008	15.0	0.013	0.198	0.6		**44.4**
11:00	**10**	**38.62**	16	**24.5**	**12.04**	31.6	0.066	0.016	15.0	0.012	0.184	0.8		**44.5**
11:15	**10**	**31.54**	19	**25**	**12.04**	31.6	0.066	0.020	15.0	0.018	0.275	1.0		**44.7**
11:30	**10**	**30.34**	20	**25**	**12.04**	31.6	0.066	0.021	15.0	0.021	0.308	1.3		**44.9**
11:45	**10**	**28.53**	21	**25**	**12.04**	31.6	0.066	0.022	15.0	0.022	0.324	1.7		**45**
12:00	**10**	**28.72**	21	**26**	**12.04**	31.6	0.066	0.022	15.0	0.022	0.332	2.0		**44.6**
12:15	**10**	**28.03**	21	**26**	**12.04**	31.5	0.066	0.023	15.0	0.022	0.335	2.3		**44.6**
12:30	**10**	**26.97**	22	**26**	**12.04**	31.6	0.066	0.023	15.0	0.023	0.346	2.7		**44.6**
12:45	**10**	**26.69**	22	**26**	**12.04**	31.6	0.066	0.024	15.0	0.024	0.354	3.0		**44.9**
13:00	**10**	**26.68**	22	**25**	**12.04**	31.5	0.066	0.024	15.0	0.024	0.357	3.4		**44.8**
13:15	**10**	**30.4**	20	**25**	**12.04**	31.5	0.066	0.021	15.0	0.022	0.335	3.7		**44.5**
13:30	**10**	**24.56**	24	**25**	**12.04**	31.4	0.066	0.026	15.0	0.023	0.350	4.1		**44.4**
13:45	**10**	**25.31**	24	**25**	**12.04**	31.4	0.066	0.025	15.0	0.025	0.381	4.5		**44.3**
14:00	**10**	**26.09**	23	**25**	**12.04**	31.4	0.066	0.024	15.0	0.025	0.370	4.8		**44.7**
14:15	**10**	**25.19**	24	**25**	**12.04**	31.4	0.066	0.025	15.0	0.025	0.370	5.2		**45.2**
14:30	**10**	**23.66**	25	**26**	**12.04**	31.4	0.066	0.027	15.0	0.026	0.388	5.6		**45.6**
14:45	**10**	**23.75**	25	**27**	**12.04**	31.5	0.065	0.027	15.0	0.027	0.399	6.0		**45.8**
15:00	**10**	**22.68**	26	**27**	**12.04**	31.4	0.065	0.028	15.0	0.027	0.407	6.4		**46**
15:15	**10**	**23.59**	25	**27**	**12.04**	31.4	0.065	0.027	15.0	0.027	0.408	6.8		**46.2**
15:30	**10**	**23.37**	26	**27**	**12.04**	31.4	0.065	0.027	15.0	0.027	0.401	7.2		**46.3**
15:45	**10**	**22.75**	26	**27**	**12.04**	31.4	0.065	0.028	15.0	0.027	0.409	7.6		**46.2**
16:00	**10**	**23.19**	26	**27**	**12.04**	31.4	0.065	0.027	15.0	0.027	0.410	8.0		**46.1**
16:15	**10**	22.97	26	**27**	**12.04**	31.4	0.065	0.027	15.0	0.027	0.408	8.4		**46**
16:30	**10**	24.12	25	**28**	**12.04**	31.4	0.065	0.026	15.0	0.027	0.400	8.8		**46**
16:45	**10**	23.81	25	**28**	**12.04**	31.4	0.065	0.026	15.0	0.026	0.392	9.2		**46**
17:00	**10**	24.47	25	**26**	**12.04**	31.4	0.066	0.026	15.0	0.026	0.390	9.6		**46.1**
17:15	**10**	23.5	26	**26**	**12.04**	31.4	0.066	0.027	15.0	0.026	0.395	10.0		**46.3**
17:30	**10**	29.66	20	**25**	**12.04**	31.4	0.066	0.021	15.0	0.024	0.361	10.4		**46.4**
17:45	**10**	27.35	22	**25**	**12.04**	31.4	0.066	0.023	15.0	0.022	0.333	10.7		**46.4**
							Avg's:	0.021	480.0			10.2	Avg:	**45.1**

Run Time	**% O2**	**% CO2**	**% H2O**	**% CO**	**PPMv TCE**	**PPMv PCE**	**PPMv TCA**	**MW**
9:45	95.6%	0.075%	4%	0.0010	2.6	2.0	1.2	31.4
9:50	95.5%	**0.075%**	4%	0.0021	**2.6**	**2.0**	**1.2**	31.4
10:00	95.3%	0.189%	4%	0.0031	39.05	2	258.1	31.5
10:15	95.1%	**0.303%**	4%	**0.0041**	**75.5**	**2.0**	**515.0**	31.5
10:30	95.2%	0.166%	4%	0.0040	152	2	216	31.5
10:45	95.1%	0.332%	4%	0.0039	305	4	431	31.5
11:00	94.9%	**0.498%**	4%	0.0038	457	6	647	31.6
11:15	95.1%	0.362%	4%	0.0036	**534**	**5.5**	**347.0**	31.6
11:30	95.1%	0.326%	4%	0.0035	601.5	4.85	327	31.6
11:45	95.2%	**0.290%**	4%	0.0034	**669**	**4.2**	**307.0**	31.6
12:00	95.2%	0.268%	4%	0.0033	635	3.1	289	31.6
12:15	95.2%	**0.247%**	4%	0.0032	**601**	**2.0**	**271.0**	31.5
12:30	95.2%	0.266%	4%	0.0031	768.5	10.35	324	31.6
12:45	95.2%	**0.285%**	4%	0.0029	**936**	**18.7**	**377.0**	31.6
13:00	95.3%	0.202%	4%	0.0028	603	28.4	220.6	31.5
13:15	95.4%	**0.120%**	4%	**0.0027**	**270**	**38.1**	**64.2**	31.5
13:30	95.5%	0.099%	4%	0.0024	195	28.25	45.2	31.4
13:45	95.5%	**0.078%**	4%	0.0021	**120**	**18.4**	**26.2**	31.4
14:00	95.5%	0.108%	4%	0.0018	135.5	18.45	28.15	31.4
14:15	95.5%	**0.139%**	4%	0.0014	**151**	**18.5**	**30.1**	31.4
14:30	95.5%	0.139%	4%	0.0011	151	18.5	30.1	31.4
14:45	95.6%	**0.139%**	4%	**0.0008**	**151**	**18.5**	**30.1**	31.5
15:00	95.6%	0.114%	4%	0.0007	112.25	15.55	21.2	31.4
15:15	95.6%	**0.090%**	4%	0.0006	**73.5**	**12.6**	**12.3**	31.4
15:30	95.6%	0.102%	4%	0.0006	69.5	12.4	12.05	31.4
15:45	95.6%	**0.113%**	4%	0.0005	**65.5**	**12.2**	**11.8**	31.4
16:00	95.6%	0.130%	4%	0.0004	50.9	10	9.25	31.4
16:15	95.6%	**0.147%**	4%	**0.0003**	**36.3**	**7.8**	**6.7**	31.4
16:30	95.6%	0.129%	4%	0.0003	32.2	7.3	5.6	31.4
16:45	95.7%	**0.111%**	4%	0.0002	**28.1**	**6.8**	**4.5**	31.4
17:00	95.7%	0.125%	4%	0.0002	25.3	6.6	4.1	31.4
17:15	95.6%	**0.139%**	4%	0.0001	**22.5**	**6.4**	**3.7**	31.4
17:30	95.7%	0.111%	4%	0.0001	19.6	5.9	2.85	31.4
17:45	**95.7%**	**0.083%**	4%	0.0000	**16.7**	**5.4**	**2.0**	31.4
							Avg:	31.5

	S Kujawa													
	8/6/2003				Gas Phase Species Mass									
	TEST RUN	**F-6**												
	Instantaneous rates:							**Integrated quantities:**						
	O2, gm/min	CO2, g/m	H2O g/m	CO g/m	TCE g/m	PCE g/m	TCA g/m	O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
Run Time														
9:45	0.0000	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0
9:50	0.0000	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.000	0.000	0.000	0.000	0.0E+00	0.0E+00	0.0E+00
10:00	0.0000	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.000	0.000	0.000	0.000	0.0E+00	0.0E+00	0.0E+00
10:15	0.0152	6.64E-05	3.78E-04	5.73E-05	4.94E-06	1.66E-07	3.42E-05	0.114	0.000	0.003	0.000	3.70E-05	1.24E-06	2.56E-04
10:30	0.0177	4.25E-05	4.41E-04	6.49E-05	1.16E-05	1.81E-07	1.67E-05	0.361	0.001	0.009	0.001	1.61E-04	3.84E-06	6.38E-04
10:45	0.0078	3.75E-05	1.94E-04	2.78E-05	1.02E-05	1.60E-07	1.47E-05	0.552	0.002	0.014	0.002	3.25E-04	6.40E-06	8.73E-04
11:00	0.0159	1.14E-04	3.95E-04	5.48E-05	3.13E-05	4.87E-07	4.49E-05	0.730	0.003	0.018	0.003	6.36E-04	1.13E-05	1.32E-03
11:15	0.0194	1.02E-04	4.83E-04	6.49E-05	4.46E-05	5.83E-07	2.94E-05	0.994	0.005	0.025	0.004	1.21E-03	1.93E-05	1.88E-03
11:30	0.0202	9.51E-05	5.03E-04	6.53E-05	5.23E-05	5.34E-07	2.88E-05	1.291	0.006	0.032	0.005	1.93E-03	2.76E-05	2.31E-03
11:45	0.0215	8.99E-05	5.34E-04	6.72E-05	6.18E-05	4.92E-07	2.88E-05	1.604	0.008	0.040	0.006	2.79E-03	3.53E-05	2.75E-03
12:00	0.0213	8.26E-05	5.30E-04	6.43E-05	5.82E-05	3.60E-07	2.69E-05	1.924	0.009	0.048	0.007	3.69E-03	4.17E-05	3.16E-03
12:15	0.0218	7.79E-05	5.43E-04	6.36E-05	5.64E-05	2.38E-07	2.58E-05	2.248	0.010	0.056	0.007	4.55E-03	4.62E-05	3.56E-03
12:30	0.0227	8.70E-05	5.63E-04	6.35E-05	7.49E-05	1.28E-06	3.20E-05	2.582	0.011	0.064	0.008	5.53E-03	5.76E-05	3.99E-03
12:45	0.0229	9.41E-05	5.69E-04	6.17E-05	9.21E-05	2.33E-06	3.77E-05	2.923	0.013	0.073	0.009	6.78E-03	8.47E-05	4.52E-03
13:00	0.0230	6.72E-05	5.72E-04	5.95E-05	5.96E-05	3.56E-06	2.21E-05	3.268	0.014	0.081	0.010	7.92E-03	1.29E-04	4.97E-03
13:15	0.0202	3.50E-05	5.02E-04	5.00E-05	2.34E-05	4.19E-06	5.65E-06	3.592	0.015	0.089	0.011	8.55E-03	1.87E-04	5.17E-03
13:30	0.0251	3.58E-05	6.22E-04	5.48E-05	2.10E-05	3.85E-06	4.93E-06	3.931	0.015	0.098	0.012	8.88E-03	2.47E-04	5.25E-03
13:45	0.0243	2.74E-05	6.03E-04	4.61E-05	1.25E-05	2.43E-06	2.78E-06	4.302	0.016	0.107	0.013	9.13E-03	2.94E-04	5.31E-03
14:00	0.0236	3.68E-05	5.84E-04	3.78E-05	1.37E-05	2.36E-06	2.89E-06	4.661	0.016	0.116	0.013	9.33E-03	3.30E-04	5.35E-03
14:15	0.0244	4.87E-05	6.05E-04	3.21E-05	1.58E-05	2.45E-06	3.20E-06	5.021	0.017	0.125	0.014	9.55E-03	3.66E-04	5.40E-03
14:30	0.0259	5.17E-05	6.42E-04	2.65E-05	1.68E-05	2.60E-06	3.39E-06	5.399	0.017	0.134	0.014	9.79E-03	4.04E-04	5.45E-03
14:45	0.0258	5.14E-05	6.39E-04	1.89E-05	1.67E-05	2.59E-06	3.38E-06	5.787	0.018	0.144	0.015	1.00E-02	4.43E-04	5.50E-03
15:00	0.0270	4.43E-05	6.68E-04	1.77E-05	1.30E-05	2.28E-06	2.49E-06	6.182	0.019	0.154	0.015	1.03E-02	4.80E-04	5.54E-03
15:15	0.0259	3.35E-05	6.42E-04	1.5E-05	8.16E-06	1.77E-06	1.39E-06	6.579	0.020	0.163	0.015	1.04E-02	5.10E-04	5.57E-03
15:30	0.0262	3.82E-05	6.48E-04	1.32E-05	7.79E-06	1.76E-06	1.37E-06	6.970	0.020	0.173	0.015	1.05E-02	5.37E-04	5.59E-03
15:45	0.0269	4.38E-05	6.66E-04	1.15E-05	7.54E-06	1.78E-06	1.38E-06	7.368	0.021	0.183	0.015	1.07E-02	5.63E-04	5.61E-03
16:00	0.0264	4.95E-05	6.53E-04	9.25E-06	5.75E-06	1.43E-06	1.06E-06	7.767	0.021	0.193	0.016	1.08E-02	5.87E-04	5.63E-03
16:15	0.0266	5.64E-05	6.59E-04	7.31E-06	4.14E-06	1.13E-06	7.75E-07	8.165	0.022	0.203	0.016	1.08E-02	6.06E-04	5.65E-03
16:30	0.0253	4.71E-05	6.27E-04	5.79E-06	3.49E-06	1.00E-06	6.16E-07	8.554	0.023	0.212	0.016	1.09E-02	6.22E-04	5.66E-03
16:45	0.0256	4.09E-05	6.34E-04	4.69E-06	3.08E-06	9.45E-07	5.01E-07	8.936	0.024	0.222	0.016	1.09E-02	6.37E-04	5.66E-03
17:00	0.0251	4.51E-05	6.21E-04	3.44E-06	2.72E-06	8.98E-07	4.47E-07	9.317	0.024	0.231	0.016	1.10E-02	6.51E-04	5.67E-03
17:15	0.0262	5.23E-05	6.48E-04	2.39E-06	2.52E-06	9.08E-07	4.21E-07	9.701	0.025	0.241	0.016	1.10E-02	6.64E-04	5.68E-03
17:30	0.0208	3.32E-05	5.14E-04	9.5E-07	1.74E-06	6.65E-07	2.57E-07	10.053	0.026	0.249	0.016	0.0111	0.0007	0.0057
								Sum of components=		10.36				
										VOC in gas/ VOC fed		1.29%	0.84%	5.96%

S Kujawa									
8/6/2003				**Test Results**	Str RPM:	**456**	Start		
TEST RUN	**F-6**								
	Results								
	Product slurry Sp. Gr.:	1.17							
	Final Product Slurry, ml:	**632**							
	Final Product Slurry, gm:	**738.6**							
	Dewar Flask net wt., gm	**0.0287**							
	Liquid/slurry Product, gm:	738.6		(Slurry Wt, 100% H2O2/O2 RXN):	626				
	Product Gas Weight, gm:	10.7							
	Product Wt, gm:	749.3							
	Total Charge Weight, gm:	**767**							
	Overall Mass Balance								
	Mass Balance Closure:	97.7%							
	Mass balance w/o gas:	96%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene		Anal. code			
	Slurry analysis, 1, mg/kg:	11.600		Slurry analysis, 1, mg/kg:	17.800				
	Slurry analysis, 2, mg/kg:	12.400		Slurry analysis, 2, mg/kg:	32.100	J			
	Avg., mg/kg	12.000		Avg., mg/kg	24.950				
	Total, mg:	8.863		Total, mg:	18.428				
	TCE, DRE, %	98.97%		HCB, DRE, %	-187.94%				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	8.820		Slurry analysis, 1, mg/kg:	6.020				
	Slurry analysis, 2, mg/kg:	9.290		Slurry analysis, 2, mg/kg:	11.300	J			
	Avg., mg/kg	9.055		Avg., mg/kg	8.660				
	Total, mg:	6.688		Total, mg:	6.396				
	PCE, DRE, %	91.68%		BP, DRE, %	-106.33%		Run time:	8	Hours
							Run Temp:	45.1	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	500	ml
	Slurry analysis, 1, mg/kg:	0.321	J	Slurry analysis, 1, mg/kg:	0.000				
	Slurry analysis, 2, mg/kg:	0.400	J	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	0.361		Avg., mg/kg	0.000				
	Total, mg:	0.266		Total, mg:	0.000				
	TCA, DRE, %	99.72%		Aroclor, DRE, %	#VALUE!				
	BEHP								
	Slurry analysis, 1, mg/kg:	626.000	E						
	Slurry analysis, 2, mg/kg:	931.000	E						
	Avg., mg/kg	778.500		Note: F6 semivolatile					
	Total, mg:	575.000		samples leaked in-transit.					
				Results questionable.					
	BEHP, DRE, %	-240.24%		Final mass of semivolatiles					
				exceeded charge to reactor.					
8/8/2003:									
All heat transfer calculations are to be considered incorrect due to uncertainty of the condenser water flow rates during the runs through run F-6.									

S Kujawa									
8/7/2003				**Heat Balance**					
TEST RUN	**F-6**					numbers in red are questionable.			
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**50**				
Time				Boss DS oil density, gm/ml	0.895				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
10:20	Water Return Temp, Deg C	**8**		Oil Return Temp, Deg C	**42.1**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.9		Bucket ck time, sec	**14.41**				
	Flow rate, ml/min	2007		Flow rate, ml/min	416				
	Enthalpy change, calorie/min:	6020		Enthalpy change, calorie/min:	-1178				
	Flask Top Surface Temp., C	**35.7**		Flask bottom Surface Temp., C	**40.5**				
	Flask Top Surface Temp., F	96		Flask bottom Surface Temp., F	105				
	Air Temp. ,F	**71.6**		Air Temp. ,F	**71.6**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	406		Convective Loss, cal/min	772				
	Radiative Loss, cal/min	140		Radiative Loss, cal/min	273				
	Flask top Heat Loss, cal/min	546		Flask bottom Heat Loss, cal/min	1046				
	Reactor Temperature, C	**44**		P1 Gas Temp. Deg C.	**24**				
	Peroxide Temperature, F	71.6		Gas Flow Rate, gm/min	0.008				
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0002				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.13				
	Peroxide Enthalpy Change, cal/mi	42.2							
				Accumulation/Generation, cal/min	-6476				
11:18	Water Return Temp, Deg C	**8.1**		Oil Return Temp, Deg C	**42.3**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.9		Bucket ck time, sec	**14**				
	Flow rate, ml/min	2007		Flow rate, ml/min	429				
	Enthalpy change, calorie/min:	6221		Enthalpy change, calorie/min:	-1181				
	Flask Top Surface Temp., C	**35.3**		Flask bottom Surface Temp., C	**41.3**				
	Flask Top Surface Temp., F	96		Flask bottom Surface Temp., F	106				
	Air Temp. ,F	**77**		Air Temp. ,F	**77**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	305		Convective Loss, cal/min	680				
	Radiative Loss, cal/min	107		Radiative Loss, cal/min	245				
	Flask top Heat Loss, cal/min	412		Flask bottom Heat Loss, cal/min	926				
	Reactor Temperature, C	**44.7**		P1 Gas Temp. Deg C.	**25.5**				
	Peroxide Temperature, F	77		Gas Flow Rate, gm/min	0.022				
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0007				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.36				
	Peroxide Enthalpy Change, cal/mi	37.8							
				Accumulation/Generation, cal/min	-6415				

12:27	Water Return Temp, Deg C	**8.4**		Oil Return Temp, Deg C	**42.2**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.9		Bucket ck time, sec	**14.63**				
	Flow rate, ml/min	2007		Flow rate, ml/min	410				
	Enthalpy change, calorie/min:	6823		Enthalpy change, calorie/min:	-1145				
	Flask Top Surface Temp., C	**32.5**		Flask bottom Surface Temp., C	**40.9**				
	Flask Top Surface Temp., F	91		Flask bottom Surface Temp., F	106				
	Air Temp. ,F	**78.8**		Air Temp. ,F	**78.8**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	192		Convective Loss, cal/min	622				
	Radiative Loss, cal/min	67		Radiative Loss, cal/min	225				
	Flask top Heat Loss, cal/min	259		Flask bottom Heat Loss, cal/min	847				
	Reactor Temperature, C	**44.6**		P1 Gas Temp. Deg C.	**27**				
	Peroxide Temperature, F	78.8		Gas Flow Rate, gm/min	0.023				
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0007				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.38				
	Peroxide Enthalpy Change, cal/mi	35.7							
S Kujawa									
8/7/2003				Accumulation/Generation, cal/min	-6820				

S Kujawa									
8/7/2003									
TEST RUN	**F-6**								
13:25	Water Return Temp, Deg C	**7.5**		Oil Return Temp, Deg C	**40.9**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.9		Bucket ck time, sec	**14.28**				
	Flow rate, ml/min	2007		Flow rate, ml/min	420				
	Enthalpy change, calorie/min:	5017		Enthalpy change, calorie/min:	-1369				
	Flask Top Surface Temp., C	**30.5**		Flask bottom Surface Temp., C	**40.3**				
	Flask Top Surface Temp., F	87		Flask bottom Surface Temp., F	105				
	Air Temp. ,F	**76.1**		Air Temp. ,F	**76.1**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	178		Convective Loss, cal/min	659				
	Radiative Loss, cal/min	61		Radiative Loss, cal/min	236				
	Flask top Heat Loss, cal/min	238		Flask bottom Heat Loss, cal/min	896				
	Reactor Temperature, C	**44.4**		P1 Gas Temp. Deg C.	**25**				
	Peroxide Temperature, F	76.1		Gas Flow Rate, gm/min	0.023				
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0007				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.38				
	Peroxide Enthalpy Change, cal/mi	38.2							
				Accumulation/Generation, cal/min	-4820				
14:35	Water Return Temp, Deg C	**8.8**		Oil Return Temp, Deg C	**42.5**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.9		Bucket ck time, sec	**14.28**				
	Flow rate, ml/min	2007		Flow rate, ml/min	420				
	Enthalpy change, calorie/min:	7625		Enthalpy change, calorie/min:	-1128				
	Flask Top Surface Temp., C	**32.8**		Flask bottom Surface Temp., C	**41.3**				
	Flask Top Surface Temp., F	91		Flask bottom Surface Temp., F	106				
	Air Temp. ,F	**78.8**		Air Temp. ,F	**78.8**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	201		Convective Loss, cal/min	639				
	Radiative Loss, cal/min	70		Radiative Loss, cal/min	231				
	Flask top Heat Loss, cal/min	271		Flask bottom Heat Loss, cal/min	870				
	Reactor Temperature, C	**45.6**		P1 Gas Temp. Deg C.	**27**				
	Peroxide Temperature, F	78.8		Gas Flow Rate, gm/min	0.026				
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0008				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.42				
	Peroxide Enthalpy Change, cal/mi	0.0							
				Accumulation/Generation, cal/min	-7639				

15:19	Water Return Temp, Deg C	**8.3**		Oil Return Temp, Deg C	**42.9**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.9		Bucket ck time, sec	**14.28**				
	Flow rate, ml/min	2007		Flow rate, ml/min	420				
	Enthalpy change, calorie/min:	6622		Enthalpy change, calorie/min:	-1068				
	Flask Top Surface Temp., C	**33.6**		Flask bottom Surface Temp., C	**41.7**				
	Flask Top Surface Temp., F	92		Flask bottom Surface Temp., F	107				
	Air Temp. ,F	**80.6**		Air Temp. ,F	**80.6**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	195		Convective Loss, cal/min	614				
	Radiative Loss, cal/min	69		Radiative Loss, cal/min	224				
	Flask top Heat Loss, cal/min	264		Flask bottom Heat Loss, cal/min	837				
	Reactor Temperature, C	**46.2**		P1 Gas Temp. Deg C.	**28**				
	Peroxide Temperature, F	80.6		Gas Flow Rate, gm/min	0.027				
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0008				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.45				
	Peroxide Enthalpy Change, cal/mi	0.0							
				Accumulation/Generation, cal/min	-6656				

	S Kujawa												
	8/11/2003						Reactor Charge						
	TEST RUN	**F-13**											
				SURROGATE				**Target**				**Actual**	
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
		Charge:				150							
	water					120.0442	120.04			**120.198**			
	hydraulic oil					2.0938	2.38			**2.167**			
	cutting oil					2.0938	2.38			**2.104**			
	Al2O3					0.3349	0.08	83.9		**0.3350**			
	CaO					0.5413	0.16	163.0		**0.5412**			
	Cr2O3					0.2326	0.04	44.6		**0.2335**			
	Fe2O3					1.3032	0.44	435.1		**1.3039**			
	MgO					0.7269	0.38	375.9		**0.7275**			
	MnO					0.4254	0.08	82.1		**0.4251**			
	SiO2					8.3907	3.71	3712.7		**8.3909**			
	Na3PO4					12.2584	4.83	4831.8		**12.2581**			
	KOH					0.3224	0.16	157.8		**0.3217**			
	Hg					0.0516	0.00	3.8		**0.0534**			4
	Aroclor-1260									**none**			
	TCE					0.8431	0.58	577.5		**0.8612**			
	PCE					0.0747	0.05	45.8		**0.0754**			
	TCA					0.0941	0.07	70.2		**0.0951**			
	BEHP					0.1619	0.17	165.2		**0.1649**			
		Total:				150.0	135.55			150.3			
				REAGENTS									
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
	HCB					0.0056				**0.0057**			
	BP					0.0029				**0.0032**			
	FeSO4 7H2O					1.5				**1.501**			
	H2O2 (50%)					480	400			480	**400**		
	H2SO4 (con)									**10.2456**			
	NaOH (4 M)									**4.619**			
		Total:				631.5				646.6			

	S Kujawa													
	8/11/2003													
	TEST RUN	**F-13**												
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, C**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
8:30	**0**	1	0	25	**12.08**	31.3	0.066	0.000	0.0	0.000	0.000	0.0		**51.3**
8:35	**0**	1	0	25	**12.08**	31.3	0.066	0.000	5.0	0.000	0.000	0.0		**48.4**
8:45	**0**	1	0	**21**	**12.08**	31.3	0.067	0.000	10.0	0.000	0.000	0.0		**45.3**
9:00	**0**	1	0	**21**	**12.08**	31.3	0.067	0.000	15.0	0.000	0.000	0.0		**43.5**
9:15	**0**	1	0	**21**	**12.08**	31.3	0.067	0.000	15.0	0.000	0.000	0.0		**43.3**
9:30	**0**	1	0	**21**	**12.08**	31.3	0.067	0.000	15.0	0.000	0.000	0.0		**43.5**
9:45	**10**	30.9	19	**25**	**12.08**	31.3	0.066	0.020	15.0	0.010	0.153	0.2		**43.7**
10:00	**10**	33.97	18	**25**	**12.08**	31.3	0.066	0.019	15.0	0.020	0.293	0.4		**43.7**
10:15	**10**	**25.28**	24	**26**	**12.08**	31.3	0.065	0.025	15.0	0.022	0.326	0.8		**43.9**
10:30	**10**	**27.28**	22	**26**	**12.08**	31.3	0.065	0.023	15.0	0.024	0.360	1.1		**44.3**
10:45	**10**	**26.25**	23	**27**	**12.08**	**31.3**	0.065	0.024	15.0	0.024	0.353	1.5		**44.6**
11:00	**10**	**24.28**	25	**28**	**12.08**	31.3	0.065	0.026	15.0	0.024	0.366	1.5		**45**
11:15	**10**	**23.16**	26	**29**	**12.08**	31.3	0.065	0.027	15.0	0.026	0.396	1.9		**45.4**
11:30	**10**	**23**	26	**29**	**12.08**	31.3	0.065	0.027	15.0	0.027	0.406	2.3	End H2O2	**45.7**
11:45	**10**	**23.31**	26	**29**	**12.08**	31.3	0.065	0.027	15.0	0.027	0.404	2.7		**46.3**
12:00	**10**	**20.09**	30	**30**	**12.08**	31.3	0.065	0.031	15.0	0.029	0.433	3.1		**46.8**
12:15	**10**	**21.09**	28	**30**	**12.08**	31.3	0.065	0.030	15.0	0.030	0.454	3.6		**47.1**
12:30	**10**	**22.15**	27	**30**	**12.08**	31.3	0.065	0.028	15.0	0.029	0.432	4.0		**47.2**
12:45	**10**	**20.91**	29	**30**	**12.08**	31.3	0.065	0.030	15.0	0.029	0.433	4.5		**47.3**
13:00	**10**	**21.47**	28	**30**	**12.08**	31.3	0.065	0.029	15.0	0.029	0.440	4.9		**47.3**
13:15	**10**	**22.03**	27	**31**	**12.08**	31.3	0.065	0.028	15.0	0.029	0.428	5.3		**47.4**
13:30	**10**	**20.94**	29	**31**	**12.08**	31.3	0.064	0.030	15.0	0.029	0.433	5.8		**47.5**
13:45	**10**	**21.38**	28	**31**	**12.08**	31.3	0.064	0.029	15.0	0.029	0.439	6.2		**47.5**
14:00	**10**	**22.3**	27	**31**	**12.1**	31.3	0.065	0.028	15.0	0.028	0.426	6.6		**47.6**
14:15	**10**	**23.62**	25	**29**	**12.1**	31.3	0.065	0.026	15.0	0.027	0.408	7.0		**47.4**
14:30	**10**	**23.81**	25	**27**	**12.1**	31.3	0.065	0.026	15.0	0.026	0.397	7.4		**46.8**
14:45	**10**	**24.59**	24	**27**	**12.1**	31.3	0.065	0.026	15.0	0.026	0.390	7.8		**46.6**
15:00	**10**	**26.9**	22	**23**	**12.06**	31.3	0.066	0.024	15.0	0.025	0.369	8.2		**46.2**
15:15	**10**	**27.12**	22	**23**	**12.06**	31.3	0.066	0.023	15.0	0.024	0.353	8.5		**45.7**
15:30	**10**	**29.025**	21	**24**	**12.02**	31.3	0.066	0.022	15.0	0.023	0.339	8.9		**45.5**
15:45	**10**	**28.3**	21	**23**	**12.02**	31.3	0.066	0.022	15.0	0.022	0.331	9.2		**45.2**
16:00	**10**	**28.81**	21	**23**	**12.02**	31.3	0.066	0.022	15.0	0.022	0.333	9.5		**45.1**
16:15	**10**	**30.97**	19	**24**	**12.02**	31.3	0.066	0.020	15.0	0.021	0.318	9.9		**45**
16:30	**10**	**30.25**	20	**24**	**12.02**	31.3	0.066	0.021	15.0	0.021	0.309	10.2		**45**
16:45	**10**	**30.47**	20	**24**	**12.02**	31.3	0.066	0.021	15.0	0.021	0.312	10.5		**45.1**
17:00	**10**	**31.25**	19	**24**	**12.02**	31.3	0.066	0.020	15.0	0.020	0.307	10.8		**45**
17:15	**10**	**33.52**	18	**23**	**12.02**	31.3	0.066	0.019	15.0	0.020	0.293	11.1		**44.9**
17:30	**10**	**31.53**	19	**25**	**12.02**	31.3	0.065	0.020	15.0	0.019	0.291	11.4		**44.8**
17:45	**10**	**30.56**	20	**25**	**12.02**	31.3	0.065	0.021	15.0	0.020	0.304	11.7		**45**
18:00	**10**	**31.1**	19	**25**	**12.02**	31.3	0.065	0.020	15.0	0.020	0.306	12.0		**45**
18:15	**10**	**30.25**	20	**25**	**12.02**	31.3	0.065	0.021	15.0	0.021	0.308	12.3		**45**
18:30	**10**	**31**	19	**25**	**12.02**	31.3	0.065	0.020	15.0	0.021	0.308	12.6		**45.1**
18:45	**10**	**27.88**	22	**26**	**12.02**	31.3	0.065	0.023	15.0	0.021	0.321	12.9		**45.3**
19:00	**10**	**28.68**	21	**25**	**12.02**	31.3	0.065	0.022	15.0	0.022	0.333	13.3		**45.4**
19:15	**10**	**29.03**	21	**26**	**12.02**	31.3	0.065	0.022	15.0	0.022	0.326	13.6		**45.4**
19:30	**10**	**28.19**	21	**26**	**12.02**	31.3	0.065	0.022	15.0	0.022	0.329	13.9		**45.5**
19:45	**10**	**28.44**	21	**26**	**12.02**	31.3	0.065	0.022	15.0	0.022	0.332	14.2		**45.6**
20:00	**10**	**30.32**	20	**26**	**12.02**	31.3	0.065	0.021	15.0	0.021	0.320	14.6		**45.7**
20:15	**10**	**28.72**	21	**26**	**12.02**	31.3	0.065	0.022	15.0	0.021	0.319	14.9		**45.6**
20:30	**10**	**29**	21	**26**	**12.02**	31.3	0.065	0.022	15.0	0.022	0.326	15.2		**45.4**
							Avg's:	0.021	720.0			15.1	Avg:	**45.7**

Note: At the end of data collection, gas was still being generated at the rate it had been throughout the run. Reaction was still occurring. STK, 8/12/03

	S Kujawa												
	8/21/2003												
	TEST RUN	**F-13**											
Run Time	**% O2**	**% CO2**	**% H2O**	**% CO**	**PPMv TCE**	**PPMv PCE**	**PPMv TCA**	**MW**					
8:30	95.5%	0.2632%	4%	0.0010%	14.3	17.2	5.2	31.4					
8:35	95.5%	**0.2632%**	4%	0.0010%	**14.3**	**17.2**	**5.2**	31.4					
8:45	95.5%	0.2546%	4%	0.0010%	12.45	13.9	5.2	31.4					
9:00	95.6%	**0.2460%**	4%	0.0010%	**10.6**	**10.6**	**5.2**	31.4					
9:15	95.6%	0.2425%	4%	0.0010%	18.15	10.95	5.6	31.4					
9:30	95.6%	**0.2389%**	4%	0.0010%	**25.7**	**11.3**	**6**	31.4					
9:45	95.6%	0.2387%	4%	0.0010%	77.85	11.9	19.6	31.5					
10:00	95.6%	**0.2384%**	4%	0.0010%	**130**	**12.5**	**33.2**	31.5					
10:15	95.5%	0.2694%	4%	0.0026%	84.4	11.45	19.5	31.5					
10:30	95.5%	**0.3003%**	4%	0.0026%	**38.8**	**10.4**	**5.8**	31.5					
10:45	95.5%	0.3047%	4%	0.0026%	36.95	14.95	5.45	31.5					
11:00	95.5%	**0.3090%**	4%	0.0026%	**35.1**	**19.5**	**5.1**	31.5					
11:15	95.5%	0.3056%	4%	0.0016%	41.25	16	5.85	31.5					
11:30	95.5%	**0.3021%**	4%	0.0016%	**47.4**	**12.5**	**6.6**	31.5					
11:45	95.5%	0.2843%	4%	0.0016%	28.1	10.85	4.35	31.5					
12:00	95.5%	**0.2664%**	4%	0.0016%	**8.8**	**9.2**	**2.1**	31.4					
12:15	95.5%	0.2759%	4%	0.0006%	24.9	11	3	31.5					
12:30	95.5%	**0.2854%**	4%	0.0006%	**41**	**12.8**	**3.9**	31.5					
12:45	95.5%	0.2882%	4%	0.0006%	33.05	10.6	3.45	31.5					
13:00	95.5%	**0.2909%**	4%	0.0006%	**25.1**	**8.4**	**3**	31.5					
13:15	95.5%	0.2877%	4%	0.0006%	25.05	9.25	2.85	31.5					
13:30	95.5%	**0.2844%**	4%	0.0006%	**25**	**10.1**	**2.7**	31.5					
13:45	95.5%	0.2730%	4%	0.0006%	18.35	9.25	2.4	31.4	recalibrate time?				
14:00	95.5%	**0.2616%**	4%	0.0006%	**11.7**	**8.4**	**2.1**	31.4					
14:15	95.5%	0.2661%	4%	0.0011%	14.7	8.9	2.1	31.4					
14:30	95.5%	**0.2705%**	4%	0.0011%	**17.7**	**9.4**	**2.1**	31.5					
14:45	95.5%	0.2736%	4%	0.0011%	13.55	8.65	2.1	31.4					
15:00	95.5%	**0.2766%**	4%	0.0011%	**9.4**	**7.9**	**2.1**	31.4					
15:15	95.5%	0.2783%	4%	0.0014%	8.8	8.35	2.1	31.4					
15:30	95.5%	**0.2800%**	4%	0.0014%	**8.2**	**8.8**	**2.1**	31.4					
15:45	95.5%	0.2747%	4%	0.0014%	8.9	8.15	2.1	31.4					
16:00	95.5%	**0.2694%**	4%	0.0014%	**9.6**	**7.5**	**2.1**	31.4					
16:15	95.5%	0.2766%	4%	0.0014%	7.05	6.75	2.1	31.4					
16:30	95.5%	**0.2838%**	4%	0.0014%	**4.5**	**6**	**2.1**	31.4					
16:45	95.5%	0.2845%	4%	0.0011%	4.5	6	2.1	31.4					
17:00	95.5%	**0.2851%**	4%	0.0011%	**4.5**	**6**	**2.1**	31.4					
17:15	95.5%	0.2777%	4%	0.0011%	4.5	6	2.1	31.4					
17:30	95.5%	**0.2703%**	4%	0.0011%	**4.5**	**6**	**2.1**	31.4					
17:45	95.5%	0.2621%	4%	0.0011%	4.5	6	2.1	31.4					
18:00	95.5%	**0.2539%**	4%	0.0011%	**4.5**	**6**	**2.1**	31.4					
18:15	95.5%	0.2663%	4%	0.0011%	5.1	6.3	2.1	31.4					
18:30	95.5%	**0.2787%**	4%	0.0011%	**5.7**	**6.6**	**2.1**	31.4					
18:45	95.5%	0.2709%	4%	0.0011%	5.1	6.3	2.1	31.4					
19:00	95.5%	**0.2631%**	4%	0.0011%	**4.5**	**6**	**2.1**	31.4					
19:15	95.5%	0.2639%	4%	0.0011%	4.5	6	2.1	31.4					
19:30	95.5%	**0.2646%**	4%	0.0011%	**4.5**	**6**	**2.1**	31.4					
19:45	95.5%	0.2830%	4%	0.0011%	4.5	6	2.1	31.4					
20:00	95.5%	**0.3013%**	4%	0.0011%	**4.5**	**6**	**2.1**	31.4					
20:15	95.5%	0.2905%	4%	0.0011%	4.5	6	2.1	31.4					
20:30	95.5%	**0.2796%**	4%	0.0011%	**4.5**	**6**	**2.1**	31.4					

	S Kujawa													
	8/21/2003													
	TEST RUN	**F-13**												
	Instantaneous rates:							**Integrated quantities:**						
	O2, gm/min	CO2, g/m	H2O g/m	CO g/m	TCE g/m	PCE g/m	TCA g/m	O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
Run Time														
8:30	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0
8:35	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8:45	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9:00	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9:15	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9:30	0.0000	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9:45	0.0200	0.0001	0.0005	0.0000	6.66E-06	1.29E-06	1.70E-06	0.150	0.001	0.004	0.000	0.000	0.000	0.000
10:00	0.0182	0.0001	0.0004	0.0000	1.01E-05	1.23E-06	2.62E-06	0.436	0.001	0.011	0.000	0.000	0.000	0.000
10:15	0.0243	0.0001	0.0006	0.0000	8.80E-06	1.51E-06	2.06E-06	0.755	0.003	0.019	0.000	0.000	0.000	0.000
10:30	0.0225	0.0001	0.0006	0.0000	3.75E-06	1.27E-06	5.69E-07	1.106	0.004	0.027	0.000	0.000	0.000	0.000
10:45	0.0233	0.0001	0.0006	0.0000	3.70E-06	1.90E-06	5.54E-07	1.451	0.006	0.036	0.000	0.000	0.000	0.000
11:00	0.0252	0.0001	0.0006	0.0000	3.79E-06	2.67E-06	5.58E-07	1.814	0.007	0.045	0.000	0.001	0.000	0.000
11:15	0.0263	0.0001	0.0007	0.0000	4.66E-06	2.29E-06	6.70E-07	2.201	0.009	0.054	0.000	0.001	0.000	0.000
11:30	0.0265	0.0001	0.0007	0.0000	5.39E-06	1.80E-06	7.62E-07	2.597	0.011	0.064	0.000	0.001	0.000	0.000
11:45	0.0261	0.0001	0.0006	0.0000	3.15E-06	1.54E-06	4.94E-07	2.992	0.012	0.074	0.000	0.001	0.000	0.000
12:00	0.0303	0.0001	0.0007	0.0000	1.14E-06	1.51E-06	2.77E-07	3.415	0.014	0.084	0.000	0.001	0.000	0.000
12:15	0.0288	0.0001	0.0007	0.0000	3.08E-06	1.72E-06	3.76E-07	3.858	0.016	0.095	0.000	0.001	0.000	0.000
12:30	0.0274	0.0001	0.0007	0.0000	4.82E-06	1.90E-06	4.65E-07	4.280	0.017	0.106	0.000	0.001	0.000	0.000
12:45	0.0290	0.0001	0.0007	0.0000	4.11E-06	1.67E-06	4.36E-07	4.703	0.019	0.116	0.000	0.001	0.000	0.000
13:00	0.0283	0.0001	0.0007	0.0000	3.04E-06	1.29E-06	3.69E-07	5.133	0.021	0.127	0.000	0.001	0.000	0.000
13:15	0.0275	0.0001	0.0007	0.0000	2.95E-06	1.38E-06	3.41E-07	5.551	0.023	0.137	0.000	0.001	0.000	0.000
13:30	0.0289	0.0001	0.0007	0.0000	3.10E-06	1.58E-06	3.39E-07	5.974	0.024	0.148	0.000	0.001	0.000	0.000
13:45	0.0283	0.0001	0.0007	0.0000	2.23E-06	1.42E-06	2.95E-07	6.403	0.026	0.158	0.000	0.001	0.000	0.000
14:00	0.0272	0.0001	0.0007	0.0000	1.36E-06	1.24E-06	2.49E-07	6.819	0.028	0.168	0.000	0.001	0.000	0.000
14:15	0.0259	0.0001	0.0006	0.0000	1.63E-06	1.25E-06	2.36E-07	7.218	0.029	0.178	0.000	0.001	0.000	0.000
14:30	0.0258	0.0001	0.0006	0.0000	1.96E-06	1.32E-06	2.36E-07	7.605	0.031	0.188	0.000	0.001	0.000	0.000
14:45	0.0250	0.0001	0.0006	0.0000	1.45E-06	1.17E-06	2.28E-07	7.986	0.032	0.197	0.000	0.001	0.000	0.000
15:00	0.0231	0.0001	0.0006	0.0000	9.29E-07	9.89E-07	2.11E-07	8.346	0.034	0.206	0.000	0.001	0.001	0.000
15:15	0.0229	0.0001	0.0006	0.0000	8.63E-07	1.04E-06	2.09E-07	8.691	0.035	0.215	0.000	0.001	0.001	0.000
15:30	0.0212	0.0001	0.0005	0.0000	7.46E-07	1.01E-06	1.94E-07	9.021	0.036	0.223	0.000	0.001	0.001	0.000
15:45	0.0218	0.0001	0.0005	0.0000	8.33E-07	9.67E-07	2.00E-07	9.344	0.038	0.231	0.000	0.001	0.001	0.000
16:00	0.0215	0.0001	0.0005	0.0000	8.83E-07	8.74E-07	1.96E-07	9.669	0.039	0.239	0.000	0.001	0.001	0.000
16:15	0.0199	0.0001	0.0005	0.0000	6.01E-07	7.29E-07	1.82E-07	9.979	0.040	0.247	0.000	0.001	0.001	0.000
16:30	0.0204	0.0001	0.0005	0.0000	3.93E-07	6.64E-07	1.86E-07	10.281	0.041	0.254	0.000	0.001	0.001	0.000
16:45	0.0202	0.0001	0.0005	0.0000	3.90E-07	6.59E-07	1.85E-07	10.586	0.043	0.262	0.000	0.001	0.001	0.000
17:00	0.0197	0.0001	0.0005	0.0000	3.80E-07	6.42E-07	1.80E-07	10.885	0.044	0.269	0.000	0.001	0.001	0.000
17:15	0.0184	0.0001	0.0005	0.0000	3.56E-07	6.01E-07	1.69E-07	11.171	0.045	0.276	0.000	0.001	0.001	0.000
17:30	0.0195	0.0001	0.0005	0.0000	3.76E-07	6.36E-07	1.78E-07	11.456	0.046	0.283	0.000	0.001	0.001	0.000
17:45	0.0201	0.0001	0.0005	0.0000	3.88E-07	6.56E-07	1.84E-07	11.753	0.047	0.291	0.000	0.001	0.001	0.000
18:00	0.0198	0.0001	0.0005	0.0000	3.81E-07	6.44E-07	1.81E-07	12.052	0.048	0.298	0.000	0.001	0.001	0.000
18:15	0.0203	0.0001	0.0005	0.0000	4.44E-07	6.96E-07	1.86E-07	12.353	0.050	0.306	0.000	0.001	0.001	0.000
18:30	0.0198	0.0001	0.0005	0.0000	4.84E-07	7.10E-07	1.81E-07	12.654	0.051	0.313	0.000	0.001	0.001	0.000
18:45	0.0220	0.0001	0.0005	0.0000	4.81E-07	7.52E-07	2.01E-07	12.968	0.052	0.321	0.000	0.001	0.001	0.000
19:00	0.0214	0.0001	0.0005	0.0000	4.13E-07	6.98E-07	1.96E-07	13.293	0.053	0.329	0.000	0.001	0.001	0.000
19:15	0.0211	0.0001	0.0005	0.0000	4.07E-07	6.87E-07	1.93E-07	13.612	0.054	0.337	0.000	0.001	0.001	0.000
19:30	0.0217	0.0001	0.0005	0.0000	4.19E-07	7.07E-07	1.98E-07	13.933	0.056	0.345	0.000	0.001	0.001	0.000
19:45	0.0215	0.0001	0.0005	0.0000	4.15E-07	7.01E-07	1.97E-07	14.257	0.057	0.353	0.000	0.001	0.001	0.000
20:00	0.0202	0.0001	0.0005	0.0000	3.89E-07	6.58E-07	1.84E-07	14.570	0.058	0.361	0.000	0.001	0.001	0.000
20:15	0.0213	0.0001	0.0005	0.0000	4.11E-07	6.94E-07	1.95E-07	14.881	0.060	0.368	0.000	0.001	0.001	0.000
20:30	0.0211	0.0001	0.0005	0.0000	4.07E-07	6.88E-07	1.93E-07	15.199	0.061	0.376	0.00017	0.0014	0.0007	0.0003
								O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
								Sum of components=		15.64				
										VOC in gas/ VOC fed		0.16%	0.99%	0.29%

S Kujawa									
8/11/2003				**Test Results**	Str RPM:		Start		
TEST RUN	**F-13**								
	Results								
	Product slurry Sp. Gr.:	1.15							
	Final Product Slurry, ml:	**538**							
	Final Product Slurry, gm:	**619.3**							
	Dewar Flask net wt., gm	**0.0057**							
	Liquid/slurry Product, gm:	**619.3**		(Slurry Wt, 100% H2O2/O2 RXN):	534				
	Product Gas Weight, gm:	15.2		**Gas Results are "Somewhat" dummy numbers pending analyses**					
	Product Wt, gm:	634.5							
	Total Charge Weight, gm:	**647**							
	Overall Mass Balance								
	Mass Balance Closure:	98.1%							
	Mass balance w/o gas:	96%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene		Anal. code			
	Slurry analysis, 1, mg/kg:	0.819	J	Slurry analysis, 1, mg/kg:	3.900	J			
	Slurry analysis, 2, mg/kg:	1.550	J	Slurry analysis, 2, mg/kg:	3.350	J			
	Avg., mg/kg	1.185		Avg., mg/kg	3.625				
	Total, mg:	0.734		Total, mg:	2.245				
	TCE, DRE, %	99.91%		HCB, DRE, %	60.61%				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	4.870		Slurry analysis, 1, mg/kg:	3.640	J			
	Slurry analysis, 2, mg/kg:	9.620		Slurry analysis, 2, mg/kg:	2.980	J			
	Avg., mg/kg	7.245		Avg., mg/kg	3.310				
	Total, mg:	4.487		Total, mg:	2.050				
	PCE, DRE, %	94.05%		BP, DRE, %	35.94%		Run time:	12	Hours
							Run Temp:	45.7	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	400	ml
	Slurry analysis, 1, mg/kg:	1.940	U	Slurry analysis, 1, mg/kg:	tbd				
	Slurry analysis, 2, mg/kg:	1.920	U	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	1.930		Avg., mg/kg	#DIV/0!				
	Total, mg:	1.195		Total, mg:	#DIV/0!				
	TCA, DRE, %	98.74%		Aroclor, DRE, %	#DIV/0!				
	BEHP								
	Slurry analysis, 1, mg/kg:	309	D						
	Slurry analysis, 2, mg/kg:	190	D						
	Avg., mg/kg	250							
	Total, mg:	155							
	BEHP, DRE, %	6.30%							
		Residual peroxide test shows approximately 35% in the aqueous layer.							

S Kujawa									
8/11/2003									
TEST RUN	**F-13**	**Heat Balance**							
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**50**				
		The heat balance and heat generation calculations are very uncertain due to lack of physical properties for the heating oil. Efforts are being made to determine operating heat capacities and densities.							
				Boss DS oil density, gm/ml	0.895				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
9:38	Water Return Temp, Deg C	**7.9**		Oil Return Temp, Deg C	**42.3**				
	bucket ck volume, ml	100		bucket ck volume, ml	**100**				
	Bucket ck time, sec	3.09		Bucket ck time, sec	**15.22**				
	Flow rate, ml/min	1942		Flow rate, ml/min	394				
	Enthalpy change, calorie/min:	5631		Enthalpy change, calorie/min:	-1087				
	Flask Top Surface Temp., C	**35.4**		Flask bottom Surface Temp., C	**38.8**				
	Flask Top Surface Temp., F	96		Flask bottom Surface Temp., F	102				
	Air Temp. ,F	**77**		Air Temp. ,F	**77**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	308		Convective Loss, cal/min	576				
	Radiative Loss, cal/min	108		Radiative Loss, cal/min	205				
	Flask top Heat Loss, cal/min	416		Flask bottom Heat Loss, cal/min	781	1197			
	Reactor Temperature, C	**43.7**		P1 Gas Temp. Deg C.	**25**				
	Peroxide Temperature, F	77		Gas Flow Rate, gm/min	0.022		Correlated losses, cal/min	1251	
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0102		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	5.68		Revised Acc/generation, cal/min	-201	
	Peroxide Enthalpy Change, cal/mir	35.9							
				Accumulation/Generation, cal/min	-5783				
	Correlated losses, cal/min	1251							
	Reflux Gas Delta H, cal/min	1							
	Revised Acc/generation, cal/min	-201							
10:32	Water Return Temp, Deg C	**7.8**		Oil Return Temp, Deg C	**42.9**				
	bucket ck volume, ml	100		bucket ck volume, ml	**100**				
	Bucket ck time, sec	3.16		Bucket ck time, sec	**15.25**				
	Flow rate, ml/min	1899		Flow rate, ml/min	393				
	Enthalpy change, calorie/min:	5316		Enthalpy change, calorie/min:	-1000				
	Flask Top Surface Temp., C	**34.7**		Flask bottom Surface Temp., C	**40**				
	Flask Top Surface Temp., F	94		Flask bottom Surface Temp., F	104				
	Air Temp. ,F	**79**		Air Temp. ,F	**79**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	254		Convective Loss, cal/min	580				
	Radiative Loss, cal/min	89		Radiative Loss, cal/min	209				
	Flask top Heat Loss, cal/min	344		Flask bottom Heat Loss, cal/min	789	1132			
	Reactor Temperature, C	**44.3**		P1 Gas Temp. Deg C.	**27**				
	Peroxide Temperature, F	79		Gas Flow Rate, gm/min	0.024		Correlated losses, cal/min	1118	
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0007		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.39		Revised Acc/generation, cal/min	-154	
	Peroxide Enthalpy Change, cal/mir	34.9							
				Accumulation/Generation, cal/min	-5484				
11:35	Water Return Temp, Deg C	**6.4**		Oil Return Temp, Deg C	**43.3**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.16		Bucket ck time, sec	**14.91**				
	Flow rate, ml/min	2058		Flow rate, ml/min	402				
	Enthalpy change, calorie/min:	2881		Enthalpy change, calorie/min:	-965				
	Flask Top Surface Temp., C	**36.3**		Flask bottom Surface Temp., C	**40.4**				
	Flask Top Surface Temp., F	97		Flask bottom Surface Temp., F	105				
	Air Temp. ,F	**83**		Air Temp. ,F	**83**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	236		Convective Loss, cal/min	504				
	Radiative Loss, cal/min	84		Radiative Loss, cal/min	184				
	Flask top Heat Loss, cal/min	320		Flask bottom Heat Loss, cal/min	687	1008			
	Reactor Temperature, C	**45.7**		P1 Gas Temp. Deg C.	**29.5**				
	Peroxide Temperature, F	83		Gas Flow Rate, gm/min	0.027		Correlated losses, cal/min	952	
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0008		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.44		Revised Acc/generation, cal/min	-21	
	Peroxide Enthalpy Change, cal/mir	33.3							
				Accumulation/Generation, cal/min	-2957				

S Kujawa				**Heat Balance**					
8/11/2003									
TEST RUN	**F-13**								
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**50**				
Time				Boss DS oil density, gm/ml	0.895				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
12:35	Water Return Temp, Deg C	**6.5**		Oil Return Temp, Deg C	**43.8**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	28.25		Bucket ck time, sec	**15.7**				
	Flow rate, ml/min	2124		Flow rate, ml/min	382				
	Enthalpy change, calorie/min:	3186		Enthalpy change, calorie/min:	-848				
	Flask Top Surface Temp., C	**36.7**		Flask bottom Surface Temp., C	**40.7**				
	Flask Top Surface Temp., F	98		Flask bottom Surface Temp., F	105				
	Air Temp. ,F	**86**		Air Temp. ,F	**86**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	198		Convective Loss, cal/min	447				
	Radiative Loss, cal/min	72		Radiative Loss, cal/min	165				
	Flask top Heat Loss, cal/min	270		Flask bottom Heat Loss, cal/min	611	881			
	Reactor Temperature, C	**47.2**		P1 Gas Temp. Deg C.	**31**				
	Peroxide Temperature, F	86		Gas Flow Rate, gm/min	0.029		Correlated losses, cal/min	852	
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0008		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.47		Revised Acc/generation, cal/min	-5	
	Peroxide Enthalpy Change, cal/mir	0.0							
				Accumulation/Generation, cal/min	-3219				
13:46	Water Return Temp, Deg C	**6.5**		Oil Return Temp, Deg C	**43.9**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	28.87		Bucket ck time, sec	**15.28**				
	Flow rate, ml/min	2078		Flow rate, ml/min	393				
	Enthalpy change, calorie/min:	3117		Enthalpy change, calorie/min:	-858				
	Flask Top Surface Temp., C	**37**		Flask bottom Surface Temp., C	**41**				
	Flask Top Surface Temp., F	99		Flask bottom Surface Temp., F	106				
	Air Temp. ,F	**88**		Air Temp. ,F	**88**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	174		Convective Loss, cal/min	413				
	Radiative Loss, cal/min	63		Radiative Loss, cal/min	153				
	Flask top Heat Loss, cal/min	238		Flask bottom Heat Loss, cal/min	566	804			
	Reactor Temperature, C	**47.5**		P1 Gas Temp. Deg C.	**32.5**				
	Peroxide Temperature, F	88		Gas Flow Rate, gm/min	0.029		Correlated losses, cal/min	752	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0009		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.48		Revised Acc/generation, cal/min	104	
	Peroxide Enthalpy Change, cal/mir	0.0							
				Accumulation/Generation, cal/min	-3064				

14:35	Water Return Temp, Deg C	**6.5**		Oil Return Temp, Deg C	**42.7**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.25		Bucket ck time, sec	**15.15**				
	Flow rate, ml/min	2051		Flow rate, ml/min	396				
	Enthalpy change, calorie/min:	3077		Enthalpy change, calorie/min:	-1035				
	Flask Top Surface Temp., C	**34.5**		Flask bottom Surface Temp., C	**40.5**				
	Flask Top Surface Temp., F	94		Flask bottom Surface Temp., F	105				
	Air Temp. ,F	**80.6**		Air Temp. ,F	**80.6**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	222		Convective Loss, cal/min	563				
	Radiative Loss, cal/min	78		Radiative Loss, cal/min	204				
	Flask top Heat Loss, cal/min	300		Flask bottom Heat Loss, cal/min	768	1068			
	Reactor Temperature, C	**46.8**		P1 Gas Temp. Deg C.	**28**				
	Peroxide Temperature, F	80.6		Gas Flow Rate, gm/min	0.026		Correlated losses, cal/min	1051	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0008		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.43		Revised Acc/generation, cal/min	-17	
	Peroxide Enthalpy Change, cal/mir	0.0							
				Accumulation/Generation, cal/min	-3110				

S Kujawa				**Heat Balance**					
8/11/2003									
TEST RUN	**F-13**								
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**50**				
Time				Boss DS oil density, gm/ml	0.895				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
15:20	Water Return Temp, Deg C	**7**		Oil Return Temp, Deg C	**40.6**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	29.37		Bucket ck time, sec	**15.03**				
	Flow rate, ml/min	2043		Flow rate, ml/min	399				
	Enthalpy change, calorie/min:	4086		Enthalpy change, calorie/min:	-1343				
	Flask Top Surface Temp., C			Flask bottom Surface Temp., C					
	Flask Top Surface Temp., F	32		Flask bottom Surface Temp., F	32				
	Air Temp. ,F			Air Temp. ,F	**0**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	526		Convective Loss, cal/min	742				
	Radiative Loss, cal/min	122		Radiative Loss, cal/min	172				
	Flask top Heat Loss, cal/min	648		Flask bottom Heat Loss, cal/min	914	1562			
	Reactor Temperature, C			P1 Gas Temp. Deg C.	**23**				
	Peroxide Temperature, F	0		Gas Flow Rate, gm/min	0.000		Correlated losses, cal/min	1384	
	Peroxide Flow Rate, ml/min			Water Vap. gm/min	0.0000		Reflux Gas Delta H, cal/min	0	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.00		Revised Acc/generation, cal/min	-40	
	Peroxide Enthalpy Change, cal/mir	0.0							
				Accumulation/Generation, cal/min	-4305				
16:40	Water Return Temp, Deg C	**6.5**		Oil Return Temp, Deg C	**42**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	28.82		Bucket ck time, sec	**16.38**				
	Flow rate, ml/min	2082		Flow rate, ml/min	366				
	Enthalpy change, calorie/min:	3123		Enthalpy change, calorie/min:	-1049				
	Flask Top Surface Temp., C			Flask bottom Surface Temp., C					
	Flask Top Surface Temp., F	32		Flask bottom Surface Temp., F	32				
	Air Temp. ,F			Air Temp. ,F	**0**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	526		Convective Loss, cal/min	742				
	Radiative Loss, cal/min	122		Radiative Loss, cal/min	172				
	Flask top Heat Loss, cal/min	648		Flask bottom Heat Loss, cal/min	914	1562			
	Reactor Temperature, C			P1 Gas Temp. Deg C.	**24**				
	Peroxide Temperature, F	0		Gas Flow Rate, gm/min	0.019		Correlated losses, cal/min	1317	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0006		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.31		Revised Acc/generation, cal/min	-269	
	Peroxide Enthalpy Change, cal/mir	0.0							
				Accumulation/Generation, cal/min	-3636				
17:35	Water Return Temp, Deg C	**6.3**		Oil Return Temp, Deg C	**41.8**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	28.34		Bucket ck time, sec	**14.47**				
	Flow rate, ml/min	2117		Flow rate, ml/min	415				
	Enthalpy change, calorie/min:	2752		Enthalpy change, calorie/min:	-1217				
	Flask Top Surface Temp., C	**31.7**		Flask bottom Surface Temp., C	**39.6**				
	Flask Top Surface Temp., F	89		Flask bottom Surface Temp., F	103				
	Air Temp. ,F	**77**		Air Temp. ,F	**77**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	198		Convective Loss, cal/min	609				
	Radiative Loss, cal/min	68		Radiative Loss, cal/min	218				
	Flask top Heat Loss, cal/min	267		Flask bottom Heat Loss, cal/min	827	1094			
	Reactor Temperature, C	**44.8**		P1 Gas Temp. Deg C.	**25**				
	Peroxide Temperature, F	77		Gas Flow Rate, gm/min	0.019		Correlated losses, cal/min	1251	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0006		Reflux Gas Delta H, cal/min	1	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.32		Revised Acc/generation, cal/min	-34	
	Peroxide Enthalpy Change, cal/mir	0.0							
				Accumulation/Generation, cal/min	-2629				

S Kujawa											
8/15/2003					**Reactor Charge**						
TEST RUN	**F-20**										
			SURROGATE			**Target**				**Actual**	
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
	Charge:				150						
water					120.0442	120.04			**120.203**		
hydraulic oil					2.0938	2.38			**2.160**		
cutting oil					2.0938	2.38			**2.183**		
Al2O3					0.3349	0.08	83.9		**0.3349**		
CaO					0.5413	0.16	163.0		**0.5414**		
Cr2O3					0.2326	0.04	44.6		**0.2329**		
Fe2O3					1.3032	0.44	435.1		**1.3033**		
MgO					0.7269	0.38	375.9		**0.7271**		
MnO					0.4254	0.08	82.1		**0.4251**		
SiO2					8.3907	3.71	3712.7		**8.3915**		
Na3PO4					12.2584	4.83	4831.8		**12.2582**		
KOH					0.3224	0.16	157.8		**0.3223**		
Hg					0.0516	0.00	3.8		**0.0519**		4
Aroclor-1260									**none**		
TCE					0.8431	0.58	577.5		**0.8546**		
PCE					0.0747	0.05	45.8		**0.0705**		
TCA					0.0941	0.07	70.2		**0.0920**		
BEHP					0.1619	0.17	165.2		**0.1666**		
	Total:				150.0	135.55			150.3		
			REAGENTS								
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
HCB					0.0056				**0.0060**		
BP					0.0029				**0.0029**		
FeSO4 7H2O					1.5				**1.5015**		
H2O2 (50%)					180	150			180	**150**	
H2SO4 (con)									**13.1487**		
NaOH (4 M)									**0.349**		
	Total:				331.5				345.3		

	S Kujawa													
	8/15/2003													
	TEST RUN	**F-20**												
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, C**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
8:15	**10**	**7.44**	81	**20.5**	**12.11**	31.3	0.067	0.086	0.0	0.043	0.000	0.0		**82.9**
8:20	**10**	**4.41**	136	**21**	**12.11**	31.3	0.067	0.146	5.0	0.116	0.580	0.6		**83**
8:30	**50**	**8.1**	370	**21.5**	**12.11**	31.3	0.067	0.396	10.0	0.271	2.707	3.3		**89.6**
8:45	**50**	**6.66**	450	**22**	**12.11**	31.3	0.067	0.480	15.0	0.438	6.571	9.9		**92.6**
9:00	**50**	**7.79**	385	**22.5**	**12.11**	31.3	0.066	0.410	15.0	0.445	6.679	16.5		**92**
9:15	**50**	**8.04**	373	**23**	**12.11**	31.3	0.066	0.397	15.0	0.403	6.051	22.6		**90.5**
9:30	**50**	**9.72**	309	**22.5**	**12.11**	31.3	0.066	0.329	15.0	0.363	5.440	28.0		**90.8**
9:45	**50**	**14.07**	213	**23**	**12.11**	31.3	0.066	0.227	15.0	0.278	4.165	32.2		**89.3**
10:00	**50**	**19.78**	152	**23**	**12.11**	31.3	0.066	0.161	15.0	0.194	2.909	35.1		**87.7**
10:15	**50**	**28.38**	106	**23**	**12.11**	31.3	0.066	0.112	15.0	0.137	2.052	37.2		**86.5**
10:30	**50**	**40.85**	73	**24**	**12.11**	31.3	0.066	0.078	15.0	0.095	1.426	38.6		**85.3**
10:45	**10**	**12.09**	50	**24.5**	**12.11**	31.3	0.066	0.052	15.0	0.065	0.977	39.6		**83.4**
11:00	**10**	**17.1**	35	**25.5**	**12.11**	31.3	0.066	0.037	15.0	0.057	0.861	39.4		**83.1**
11:15	**10**	**26.66**	23	**26**	**12.11**	31.3	0.066	0.024	15.0	0.030	0.455	39.9		**82.6**
11:30	**10**	**31.47**	19	**26**	**12.11**	31.3	0.066	0.020	15.0	0.022	0.328	40.2		**82.7**
11:45	**10**	**39.5**	15	**26**	**12.11**	31.3	0.066	0.016	15.0	0.018	0.270	40.5		**82.7**
12:00	**10**	**50.03**	12	**27**	**12.15**	31.3	0.066	0.013	15.0	0.014	0.215	40.7		**82.1**
12:15	**5**	**35.31**	8	**27**	**12.15**	31.3	0.066	0.009	15.0	0.011	0.162	40.9		**81.9**
12:30	**5**	**43.75**	7	**27**	**12.15**	31.3	0.066	0.007	15.0	0.008	0.121	41.0		**82.2**
12:45	**5**	**52.88**	6	**28**	**12.15**	31.3	0.066	0.006	15.0	0.007	0.099	41.1		**82.7**
13:00	**5**	**59.47**	5	**28**	**12.15**	31.3	0.065	0.005	15.0	0.006	0.084	41.2		**82.8**
13:15	**5**	**88.85**	3	**28**	**12.15**	31.3	0.065	0.004	15.0	0.004	0.066	41.2		**83.1**
13:30	**5**	**75.62**	4	**29**	**12.15**	31.3	0.065	0.004	15.0	0.004	0.058	41.3		**83.4**
13:45	**3**	**96.12**	2	**30**	**12.15**	31.3	0.065	0.002	15.0	0.003	0.046	41.3		**83.7**
14:00	**0**	1	0	**31**	**12.15**	31.3	0.065	0.000	15.0	0.001	0.015	41.4		**83.8**
14:15	**0**	1	0	**32**	**12.16**	31.3	0.065	0.000	15.0	0.000	0.000	41.4		**83.6**
14:30	**0**	1	0	**33**	**12.16**	31.3	0.065	0.000	15.0	0.000	0.000	41.4		**83.7**
14:45	**0**	1	0	**33**	**12.16**	31.3	0.064	0.000	15.0	0.000	0.000	41.4		**84.3**
15:00	**0**	1	0	**34**	**12.16**	31.3	0.064	0.000	15.0	0.000	0.000	41.4		**84**
15:15	**0**	1	0	**34**	**12.16**	31.3	0.064	0.000	15.0	0.000	0.000	41.4		**84.1**
15:30	**0**	1	0	**34**	**12.16**	31.3	0.064	0.000	15.0	0.000	0.000	41.4		**84.5**
15:45	**0**	1	0	**34**	**12.16**	31.3	0.064	0.000	15.0	0.000	0.000	41.4		**84.1**
16:00	**0**	1	0	**34**	**12.16**	31.3	0.064	0.000	15.0	0.000	0.000	41.4		**84.5**
16:15	**0**	1	0	**33**	**12.16**	31.3	0.064	0.000	15.0	0.000	0.000	41.4		**84.6**
							Avg's:	0.089	480.0			42.6	Avg:	**84.9**

S Kujawa									
8/15/2003				**Test Results**	Str RPM:		Start		
TEST RUN	**F-20**								
	Results								
	Product slurry Sp. Gr.:	1.09							
	Final Product Slurry, ml:	**271**							
	Final Product Slurry, gm:	**295.1**							
	Dewar Flask net wt., gm	**0.3507**							
	Liquid/slurry Product, gm:	**295.5**		(Slurry Wt, 100% H2O2/O2 RXN):	303				
	Product Gas Weight, gm:	41.4							
	Product Wt, gm:	336.8							
	Total Charge Weight, gm:	**345**							
	Overall Mass Balance								
	Mass Balance Closure:	97.5%							
	Mass balance w/o gas:	86%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene		Anal. code			
	Slurry analysis, 1, mg/kg:	17.100		Slurry analysis, 1, mg/kg:	5.470				
	Slurry analysis, 2, mg/kg:	20.200		Slurry analysis, 2, mg/kg:	5.780				
	Avg., mg/kg	18.650		Avg., mg/kg	5.625				
	Total, mg:	5.504		Total, mg:	1.660				
	TCE, DRE, %	99.36%		HCB, DRE, %	72.33%				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	2.630		Slurry analysis, 1, mg/kg:	4.730	U			
	Slurry analysis, 2, mg/kg:	3.290		Slurry analysis, 2, mg/kg:	0.523	J			
	Avg., mg/kg	2.960		Avg., mg/kg	2.627				
	Total, mg:	0.873		Total, mg:	0.775				
	PCE, DRE, %	98.76%		BP, DRE, %	73.27%		Run time:	8	Hours
							Run Temp:	84.9	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	150	ml
	Slurry analysis, 1, mg/kg:	0.268	J	Slurry analysis, 1, mg/kg:	tbd				
	Slurry analysis, 2, mg/kg:	0.305	J	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	0.287		Avg., mg/kg	#DIV/0!				
	Total, mg:	0.085		Total, mg:	#DIV/0!				
	TCA, DRE, %	99.91%		Aroclor, DRE, %	#DIV/0!				
	BEHP								
	Slurry analysis, 1, mg/kg:	190	D						
	Slurry analysis, 2, mg/kg:	195							
	Avg., mg/kg	193							
	Total, mg:	57							
	BEHP, DRE, %	65.90%							

S Kujawa								
8/15/2003		**Heat Balance**						
TEST RUN	**F-20**							
	Condenser Bath			Oil Bath				
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**			
		The heat balance and heat generation calculations are very uncertain due to lack of physical properties for the heating oil. Efforts are being made to determine operating heat capacities and						
				Boss DS oil density, gm/ml	0.873			
				Boss DS oil heat cap. cal/gm/deg	0.4			
8:38	Water Return Temp, Deg C	**6.9**		Oil Return Temp, Deg C	**78.6**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**100**			
	Bucket ck time, sec	**57.84**		Bucket ck time, sec	**9.72**			
	Flow rate, ml/min	1037		Flow rate, ml/min	617			
	Enthalpy change, calorie/min:	1971		Enthalpy change, calorie/min:	-4613			
	Flask Top Surface Temp., C	**71.6**		Flask bottom Surface Temp., C	**79.4**			
	Flask Top Surface Temp., F	161		Flask bottom Surface Temp., F	175			
	Air Temp. ,F	**70.7**		Air Temp. ,F	**70.7**			
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1360		Convective Loss, cal/min	2215			
	Radiative Loss, cal/min	612		Radiative Loss, cal/min	1035			
	Flask top Heat Loss, cal/min	1972		Flask bottom Heat Loss, cal/min	3251	5222		
	Reactor Temperature, C	**89.6**		P1 Gas Temp. Deg C.	**23**			
	Peroxide Temperature, F	70.7		Gas Flow Rate, gm/min	0.438			
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0129			
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	7.18			
	Peroxide Enthalpy Change, cal/mi	130.8						
				Accumulation/Generation, cal/min	-2718			
	Correlated losses, cal/min	4708						
	Reflux Gas Delta H, cal/min	752						
	Revised Acc/generation, cal/min	-978						
9:33	Water Return Temp, Deg C	**6.8**		Oil Return Temp, Deg C	**78.5**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**58.07**		Bucket ck time, sec	**97.63**			
	Flow rate, ml/min	1033		Flow rate, ml/min	615			
	Enthalpy change, calorie/min:	1860		Enthalpy change, calorie/min:	-4614			
	Flask Top Surface Temp., C	**75.2**		Flask bottom Surface Temp., C	**78.4**			
	Flask Top Surface Temp., F	167		Flask bottom Surface Temp., F	173			
	Air Temp. ,F	**73**		Air Temp. ,F	**73**			
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1423		Convective Loss, cal/min	2128			
	Radiative Loss, cal/min	655		Radiative Loss, cal/min	995			
	Flask top Heat Loss, cal/min	2078		Flask bottom Heat Loss, cal/min	3123	5201		
	Reactor Temperature, C	**90.8**		P1 Gas Temp. Deg C.	**24**			
	Peroxide Temperature, F	73		Gas Flow Rate, gm/min	0.363			
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0107			
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	5.94			
	Peroxide Enthalpy Change, cal/mi	130.6						
				Accumulation/Generation, cal/min	-2584			
	Correlated losses, cal/min	4641						
	Reflux Gas Delta H, cal/min	623						
	Revised Acc/generation, cal/min	-780						

10:32	Water Return Temp, Deg C	**6.9**		Oil Return Temp, Deg C	**78**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**58.06**		Bucket ck time, sec	**93.93**			
	Flow rate, ml/min	1033		Flow rate, ml/min	639			
	Enthalpy change, calorie/min:	1963		Enthalpy change, calorie/min:	-4907			
	Flask Top Surface Temp., C	**67.5**		Flask bottom Surface Temp., C	**78.4**			
	Flask Top Surface Temp., F	154		Flask bottom Surface Temp., F	173			
	Air Temp. ,F	**75.2**		Air Temp. ,F	**75.2**			
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1181		Convective Loss, cal/min	2081			
	Radiative Loss, cal/min	526		Radiative Loss, cal/min	979			
	Flask top Heat Loss, cal/min	1707		Flask bottom Heat Loss, cal/min	3060	4767		
	Reactor Temperature, C	**85.3**		P1 Gas Temp. Deg C.	**24.5**			
	Peroxide Temperature, F	75.2		Gas Flow Rate, gm/min	0.095		Correlated losses, cal/min	4608
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0028		Reflux Gas Delta H, cal/min	163
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	1.56		Revised Acc/generation, cal/min	18
	Peroxide Enthalpy Change, cal/mi	117.7						
				Accumulation/Generation, cal/min	-1942			

S Kujawa									
8/15/2003		**Heat Balance**							
TEST RUN	**F-20**								
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**				
		The heat balance and heat generation calculations are very uncertain							
		due to lack of physical properties for the heating oil. Efforts are being made to determine operating heat capacities and							
				Boss DS oil density, gm/ml	0.873				
				Boss DS oil heat cap. cal/gm/deg	0.4				
11:32	Water Return Temp, Deg C	**6.9**		Oil Return Temp, Deg C	**78.1**				
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**				
	Bucket ck time, sec	**57.4**		Bucket ck time, sec	**93.94**				
	Flow rate, ml/min	1045		Flow rate, ml/min	639				
	Enthalpy change, calorie/min:	1986		Enthalpy change, calorie/min:	-4884				
	Flask Top Surface Temp., C	**64.7**		Flask bottom Surface Temp., C	**78.3**				
	Flask Top Surface Temp., F	148		Flask bottom Surface Temp., F	173				
	Air Temp. ,F	**78.8**		Air Temp. ,F	**78.8**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1050		Convective Loss, cal/min	2001				
	Radiative Loss, cal/min	466		Radiative Loss, cal/min	949				
	Flask top Heat Loss, cal/min	1517		Flask bottom Heat Loss, cal/min	2949	4466			
	Reactor Temperature, C	**82.7**		P1 Gas Temp. Deg C.	**27**				
	Peroxide Temperature, F	78.8		Gas Flow Rate, gm/min	0.022				
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0006				
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.36				
	Peroxide Enthalpy Change, cal/mi	108.9							
				Accumulation/Generation, cal/min	-1677				
	Correlated losses, cal/min	4442							
	Reflux Gas Delta H, cal/min	38							
	Revised Acc/generation, cal/min	296							
13:56	Water Return Temp, Deg C	**7.2**		Oil Return Temp, Deg C	**78.9**				
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**				
	Bucket ck time, sec	**57.75**		Bucket ck time, sec	**100.59**				
	Flow rate, ml/min	1039		Flow rate, ml/min	596				
	Enthalpy change, calorie/min:	2286		Enthalpy change, calorie/min:	-4395				
	Flask Top Surface Temp., C	**69.4**		Flask bottom Surface Temp., C	**78.8**				
	Flask Top Surface Temp., F	157		Flask bottom Surface Temp., F	174				
	Air Temp. ,F	**86**		Air Temp. ,F	**86**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1069		Convective Loss, cal/min	1867				
	Radiative Loss, cal/min	494		Radiative Loss, cal/min	903				
	Flask top Heat Loss, cal/min	1564		Flask bottom Heat Loss, cal/min	2770	4333			
	Reactor Temperature, C	**83.8**		P1 Gas Temp. Deg C.	**31**				
	Peroxide Temperature, F	86		Gas Flow Rate, gm/min	0.001		Correlated losses, cal/min	4176	
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0000		Reflux Gas Delta H, cal/min	2	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.02		Revised Acc/generation, cal/min	217	
	Peroxide Enthalpy Change, cal/mi	0.0							
				Accumulation/Generation, cal/min	-2224				

S Kujawa											
8/20/2003					**Reactor Charge**						
TEST RUN	**F-21**										
			SURROGATE			**Target**				**Actual**	
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
	Charge:				150						
water					120.0442	120.04			**120.295**		
hydraulic oil					2.0938	2.38			**2.082**		
cutting oil					2.0938	2.38			**2.159**		
Al2O3					0.3349	0.08	83.9		**0.3354**		
CaO					0.5413	0.16	163.0		**0.5407**		
Cr2O3					0.2326	0.04	44.6		**0.2339**		
Fe2O3					1.3032	0.44	435.1		**1.3030**		
MgO					0.7269	0.38	375.9		**0.7277**		
MnO					0.4254	0.08	82.1		**0.4257**		
SiO2					8.3907	3.71	3712.7		**8.3909**		
Na3PO4					12.2584	4.83	4831.8		**12.2583**		
KOH					0.3224	0.16	157.8		**0.3229**		
Hg					0.0516	0.00	3.8		**0.0638**		4
Aroclor-1260					0.0070	0.0045	4.5		**0.005**		
TCE					0.8431	0.58	577.5		**0.8525**		580
PCE					0.0747	0.05	45.8		**0.0735**		46
TCA					0.0941	0.07	70.2		**0.0810**		70
BEHP					0.1619	0.17	165.2		**0.1624**		170
	Total:				150.0	135.56			150.3		
			REAGENTS								
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**
HCB									**0.0069**		
BP									**0.0035**		
FeSO4 7H2O					1.5				**1.502**		
H2O2 (50%)					300	250			300	**250**	
H2SO4 (con)									**15.2994**		
NaOH (4 M)									**7.074**		
	Total:				451.5				474.2		

	S Kujawa													
	8/20/2003													
	TEST RUN	**F-21**												
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, C**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
9:00		**1**	0	**22**	**12.08**	31.5	0.067	0.000	0.0	0.000	0.00	0.0		**86.6**
9:05	**50**	**12.94**	232	**22**	**12.08**	31.5	0.067	0.248	5.0	0.124	0.62	0.6		**85.7**
9:15	**50**	**8.25**	364	**21**	**12.08**	31.5	0.067	0.391	10.0	0.320	3.20	3.8		**90.1**
9:30	**50**	**7.75**	387	**20**	**12.08**	31.5	0.067	0.417	15.0	0.404	6.06	9.9		**91.2**
9:45	**50**	**7.78**	386	**21.5**	**12.08**	31.5	0.067	0.413	15.0	0.415	6.23	16.1		**90.8**
10:00	**50**	**7.53**	398	**22**	**12.08**	31.5	0.067	0.426	15.0	0.420	6.30	22.4		**91.4**
10:15	**50**	**7.97**	376	**22**	**12.08**	31.5	0.067	0.403	15.0	0.414	6.22	28.6		**90.7**
10:30	**50**	**7.75**	387	**23**	**12.08**	31.5	0.067	0.413	15.0	0.408	6.12	34.7		**90.4**
10:45	**50**	**7.94**	378	**22.5**	**12.08**	31.5	0.067	0.403	15.0	0.408	6.12	40.9		**90.7**
11:00	**50**	**10.88**	276	**23**	**12.08**	31.5	0.066	0.294	15.0	0.349	5.23	46.1		**88.3**
11:15	**50**	**10**	300	**21**	**12.08**	31.5	0.067	0.322	15.0	0.308	4.62	50.7		**90.1**
11:30	**50**	**11.1**	270	**24**	**12.08**	31.5	0.066	0.287	15.0	0.291	4.36	55.1		**90**
11:45	**50**	**14.37**	209	**23**	**12.08**	31.5	0.067	0.223	15.0	0.255	3.83	58.9		**90.1**
12:00	**50**	**20.15**	149	**24**	**12.08**	31.5	0.066	0.158	15.0	0.190	2.86	61.8		**88.8**
12:15	**50**	**23.03**	130	**23.5**	**12.08**	31.5	0.066	0.139	15.0	0.148	2.23	64.0		**88.2**
12:30	**50**	**32.78**	92	**24**	**12.08**	31.5	0.066	0.097	15.0	0.118	1.77	65.7		**86.7**
12:45	**50**	**44.72**	67	**25**	**12.08**	31.5	0.066	0.071	15.0	0.084	1.26	67.0		**85.1**
13:00	**50**	**63.04**	48	**25.5**	**12.08**	31.5	0.066	0.050	15.0	0.061	0.91	67.9		**84.6**
13:15	**10**	**15.44**	39	**26**	**12.08**	31.5	0.066	0.041	15.0	0.046	0.68	68.6		**84.1**
13:30	**10**	**18.85**	32	**26**	**12.08**	31.5	0.066	0.034	15.0	0.037	0.56	69.2		**83.7**
13:45	**10**	**18.44**	33	**26.5**	**12.08**	31.5	0.066	0.034	15.0	0.034	0.51	69.7		**83.8**
14:00	**10**	**28.35**	21	**26**	**12.08**	31.5	0.066	0.022	15.0	0.028	0.43	70.1		**83.3**
14:15	**10**	**39.81**	15	**26**	**12.08**	31.6	0.066	0.016	15.0	0.019	0.29	70.4		**83**
14:30	**10**	**52.6**	11	**26.5**	**12.08**	31.6	0.066	0.012	15.0	0.014	0.21	70.6		**82.8**
14:45	**10**	**76.97**	8	**26.5**	**12.08**	31.6	0.066	0.008	15.0	0.010	0.15	70.8		**82.7**
15:00	**3**	**25.09**	7	**27**	**12.08**	31.5	0.066	0.008	15.0	0.008	0.12	70.9		**82.7**
15:15	**0**	**1**	0	**27**	**12.08**	31.5	0.066	0.000	15.0	0.004	0.06	70.9		**82.8**
15:30	**0**	**1**	0	**27**	**12.08**	31.5	0.066	0.000	15.0	0.000	0.00	70.9		**83.2**
15:45	**0**	**1**	0	**27**	**12.08**	31.4	0.066	0.000	15.0	0.000	0.00	70.9		**83**
16:00	**0**	**1**	0	**27.5**	**12.08**	31.4	0.065	0.000	15.0	0.000	0.00	70.9		**83**
16:15	**0**	**1**	0	**27.5**	**12.08**	31.4	0.065	0.000	15.0	0.000	0.00	70.9		**83**
16:30	**0**	**1**	0	**28**	**12.08**	31.4	0.065	0.000	15.0	0.000	0.00	70.9		**83.3**
16:45	**0**	**1**	0	**28**	**12.08**	31.4	0.065	0.000	15.0	0.000	0.00	70.9		**83.4**
17:00	**0**	**1**	0	**28.5**	**12.08**	31.4	0.065	0.000	15.0	0.000	0.00	70.9		**83.3**
			185				Avg's:	0.145	480.0			69.6	Avg:	**86.2**

	S Kujawa											
	8/27/2003											
	TEST RUN	**F-21**										
Run Time	**% O2**	**% CO2**	**% H2O**	**% CO**	**PPMv TCE**	**PPMv PCE**	**PPMv TCA**	**MW**				
9:00	95.4%	0.4307%	4%	0.0001%	309	9.9	90.8	31.5				
9:05	95.3%	**0.5168%**	4%	0.0004%	**309**	**9.9**	**90.8**	31.5				
9:15	95.2%	0.6052%	4%	0.0011%	169.25			31.5				
9:30	95.1%	**0.6936%**	4%	0.0022%	**29.5**	**10.6**	**1.55**	31.5				
9:45	95.2%	0.5845%	4%	0.0030%	18.75			31.5				
10:00	95.3%	**0.4754%**	4%	0.0036%	**8**	**9**	**1.55**	31.5				
10:15	95.3%	0.4831%	4%	0.0042%	8			31.5				
10:30	95.3%	**0.4908%**	4%	**0.0011%**	**8**	**7**	**1.55**	31.5				
10:45	95.3%	0.4576%	4%	0.0015%	8			31.5				
11:00	95.4%	**0.4244%**	4%	0.0030%	**8**	**7**	**1.55**	31.5				
11:15	95.3%	0.5452%	4%	0.0044%	8			31.5				
11:30	95.1%	**0.6659%**	4%	**0.0048%**	**8**	**7**	**1.55**	31.5				
11:45	95.3%	0.5105%	4%	0.0048%	8			31.5				
12:00	95.4%	**0.3551%**	4%	0.0048%	**8**	**7**	**1.55**	31.5				
12:15	95.3%	0.5109%	4%	0.0040%	8			31.5				
12:30	95.1%	**0.6667%**	4%	0.0032%	**8**	**7**	**1.55**	31.5				
12:45	95.3%	0.5217%	4%	0.0032%	8			31.5				
13:00	95.4%	**0.3766%**	4%	**0.0032%**	**8**	**7**	**1.55**	31.5				
13:15	95.3%	0.5035%	4%	0.0032%	8			31.5				
13:30	95.2%	**0.6303%**	4%	0.0032%	**8**	**7**	**1.55**	31.5				
13:45	95.1%	0.7160%	4%	0.0047%	8			31.5				
14:00	95.0%	**0.8016%**	4%	0.0062%	**8**	**7**	**1.55**	31.5				
14:15	94.6%	1.1972%	4%	0.0062%	8			31.6				
14:30	94.2%	**1.5927%**	4%	**0.0062%**	**8**	**7**	**1.55**	31.6				
14:45	94.6%	1.1721%	4%	0.0171%	8			31.6				
15:00	95.0%	**0.7515%**	4%	**0.0280%**	**8**	**7**	**1.55**	31.5				
15:15	95.1%	0.7246%	4%	0.0280%	8			31.5				
15:30	95.3%	0.4687%	4%	0.0197%	8			31.5				
15:45	95.6%	0.2265%	4%	0.0113%	8			31.4				
16:00	95.6%	**0.2146%**	4%	**0.0113%**	**8**	**7**	**1.55**	31.4				
16:15	95.6%	0.2128%	4%	0.0113%	8			31.4				
16:30	95.6%	**0.2109%**	4%	0.0113%	**8**	**7**	**1.55**	31.4				
16:45	95.6%	0.2001%	4%	0.0113%	8.35			31.4				
17:00	95.6%	**0.1893%**	4%	0.0113%	**8.7**	**7**	**1.55**	31.4				

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	8/27/2003													
	TEST RUN	**F-21**												
	Instantaneous rates:							**Integrated quantities:**						
	O2, gm/min	CO2, g/m	H2O g/m	CO g/m	TCE g/m	PCE g/m	TCA g/m	O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
9:00	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.00E+00
9:05	0.2403	0.0018	0.0060	8.14E-07	3.19E-04	0.0000	0.0001	0.601	0.004	0.015	0.000	0.001	3.24E-05	2.38E-04
9:15	0.3778	0.0033	0.0094	3.84E-06	2.75E-04	0.0000	0.0000	3.692	0.030	0.091	0.000	0.004	9.71E-05	7.14E-04
9:30	0.4032	0.0040	0.0100	8.21E-06	5.12E-05	0.0000	0.0000	9.550	0.085	0.237	0.000	0.006	2.72E-04	7.34E-04
9:45	0.4001	0.0034	0.0099	1.10E-05	3.23E-05	0.0000	0.0000	15.574	0.141	0.386	0.000	0.007	4.47E-04	7.55E-04
10:00	0.4131	0.0028	0.0102	1.37E-05	1.42E-05	0.0000	0.0000	21.673	0.187	0.537	0.000	0.007	5.99E-04	7.76E-04
10:15	0.3903	0.0027	0.0097	1.50E-05	1.34E-05	0.0000	0.0000	27.699	0.229	0.686	0.001	0.007	7.50E-04	7.97E-04
10:30	0.4000	0.0028	0.0099	4.04E-06	1.37E-05	0.0000	0.0000	33.626	0.271	0.833	0.001	0.008	8.65E-04	8.17E-04
10:45	0.3912	0.0026	0.0097	5.30E-06	1.34E-05	0.0000	0.0000	39.560	0.311	0.980	0.001	0.008	9.79E-04	8.37E-04
11:00	0.2851	0.0017	0.0071	7.72E-06	9.79E-06	0.0000	0.0000	44.632	0.344	1.106	0.001	0.008	1.06E-03	8.52E-04
11:15	0.3119	0.0025	0.0077	1.27E-05	1.07E-05	0.0000	0.0000	49.110	0.375	1.217	0.001	0.008	1.14E-03	8.66E-04
11:30	0.2778	0.0027	0.0069	1.23E-05	9.56E-06	0.0000	0.0000	53.533	0.414	1.326	0.001	0.008	1.22E-03	8.80E-04
11:45	0.2157	0.0016	0.0053	9.51E-06	7.41E-06	0.0000	0.0000	57.234	0.446	1.418	0.001	0.008	1.30E-03	8.94E-04
12:00	0.1535	0.0008	0.0038	6.76E-06	5.27E-06	0.0000	0.0000	60.003	0.463	1.486	0.002	0.009	1.34E-03	9.02E-04
12:15	0.1343	0.0010	0.0033	4.93E-06	4.62E-06	0.0000	0.0000	62.162	0.477	1.540	0.002	0.009	1.39E-03	9.10E-04
12:30	0.0941	0.0009	0.0023	2.77E-06	3.24E-06	0.0000	0.0000	63.875	0.491	1.582	0.002	0.009	1.42E-03	9.15E-04
12:45	0.0688	0.0005	0.0017	2.02E-06	2.37E-06	0.0000	0.0000	65.097	0.502	1.613	0.002	0.009	1.44E-03	9.19E-04
13:00	0.0488	0.0003	0.0012	1.43E-06	1.68E-06	0.0000	0.0000	65.979	0.507	1.634	0.002	0.009	1.46E-03	9.22E-04
13:15	0.0397	0.0003	0.0010	1.17E-06	1.37E-06	0.0000	0.0000	66.643	0.512	1.651	0.002	0.009	1.47E-03	9.24E-04
13:30	0.0325	0.0003	0.0008	9.57E-07	1.12E-06	0.0000	0.0000	67.185	0.516	1.664	0.002	0.009	1.48E-03	9.26E-04
13:45	0.0331	0.0003	0.0008	1.43E-06	1.14E-06	0.0000	0.0000	67.678	0.521	1.677	0.002	0.009	1.49E-03	9.28E-04
14:00	0.0216	0.0003	0.0005	1.23E-06	7.44E-07	0.0000	0.0000	68.088	0.525	1.687	0.002	0.009	1.49E-03	9.29E-04
14:15	0.0153	0.0003	0.0004	8.78E-07	5.30E-07	0.0000	0.0000	68.365	0.529	1.694	0.002	0.009	1.50E-03	9.30E-04
14:30	0.0115	0.0003	0.0003	6.63E-07	4.00E-07	0.0000	0.0000	68.566	0.533	1.699	0.002	0.009	1.50E-03	9.30E-04
14:45	0.0079	0.0001	0.0002	1.25E-06	2.74E-07	0.0000	0.0000	68.712	0.536	1.702	0.002	0.009	1.51E-03	9.31E-04
15:00	0.0073	0.0001	0.0002	1.88E-06	2.51E-07	0.0000	0.0000	68.826	0.538	1.705	0.002	0.009	1.51E-03	9.31E-04
15:15	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	1.51E-03	9.32E-04
15:30	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	1.51E-03	9.32E-04
15:45	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	1.51E-03	9.32E-04
16:00	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	1.51E-03	9.32E-04
16:15	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	1.51E-03	9.32E-04
16:30	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	1.51E-03	9.32E-04
16:45	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	1.51E-03	9.32E-04
17:00	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	68.880	0.538	1.706	0.002	0.009	0.00151	0.00093
								O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
								Sum of components=		71.14				
										VOC in gas/ VOC fed		1.03%	2.06%	1.15%

S Kujawa									
8/20/2003				**Test Results**	Str RPM:		Start		
TEST RUN	**F-21**								
	Results								
	Product slurry Sp. Gr.:	1.05							
	Final Product Slurry, ml:	**370**							
	Final Product Slurry, gm:	**390.1**							
	Dewar Flask net wt., gm	**0.3031**							
	Liquid/slurry Product, gm:	**390.4**		(Slurry Wt, 100% H2O2/O2 RXN):	404				
	Product Gas Weight, gm:	70.9							
	Product Wt, gm:	461.3							
	Total Charge Weight, gm:	**474.2**							
	Overall Mass Balance								
	Mass Balance Closure:	97.3%							
	Mass balance w/o gas:	82%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene		Anal. code			
	Slurry analysis, 1, mg/kg:	0.952	J	Slurry analysis, 1, mg/kg:	0.736	J			
	Slurry analysis, 2, mg/kg:	0.740	J	Slurry analysis, 2, mg/kg:	0.818	J			
	Avg., mg/kg	0.846		Avg., mg/kg	0.777				
	Total, mg:	0.330		Total, mg:	0.303				
	TCE, DRE, %	99.96%		HCB, DRE, %	95.61%				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	1.960	U	Slurry analysis, 1, mg/kg:	4.940	U			
	Slurry analysis, 2, mg/kg:	1.950	U	Slurry analysis, 2, mg/kg:	4.450	U			
	Avg., mg/kg	1.955		Avg., mg/kg	4.695				
	Total, mg:	0.763		Total, mg:	1.832				
	PCE, DRE, %	98.96%		BP, DRE, %	47.67%		Run time:	8	Hours
							Run Temp:	86.2	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	250	ml
	Slurry analysis, 1, mg/kg:	1.960	U	Slurry analysis, 1, mg/kg:	2.600				
	Slurry analysis, 2, mg/kg:	1.950	U	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	1.955		Avg., mg/kg	2.600				
	Total, mg:	0.763		Total, mg:	1.014				
	TCA, DRE, %	99.06%		Aroclor, DRE, %	79.71%				
	BEHP								
	Slurry analysis, 1, mg/kg:	22.800							
	Slurry analysis, 2, mg/kg:	25.700							
	Avg., mg/kg	24.250							
	Total, mg:	9.460							
	BEHP, DRE, %	94.17%							

S Kujawa								
8/20/2003		**Heat Balance**						
TEST RUN	**F-21**							
	Condenser Bath			Oil Bath				
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**			
		The heat balance and heat generation calculations are very uncertain						
		due to lack of physical properties for the heating oil. Efforts are						
		being made to determine operating heat capacities and densities.						
				Boss DS oil density, gm/ml	0.873			
				Boss DS oil heat cap. cal/gm/deg C	0.4			
10:45	Water Return Temp, Deg C	**6.7**		Oil Return Temp, Deg C	**80.1**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**63.06**		Bucket ck time, sec	**94.5**			
	Flow rate, ml/min	951		Flow rate, ml/min	635			
	Enthalpy change, calorie/min:	1618		Enthalpy change, calorie/min:	-4412			
	Flask Top Surface Temp., C	**67.9**		Flask bottom Surface Temp., C	**72.6**			
	Flask Top Surface Temp., F	154		Flask bottom Surface Temp., F	163			
	Air Temp. ,F	**76.5**		Air Temp. ,F	**76.5**			
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1172		Convective Loss, cal/min	1832			
	Radiative Loss, cal/min	525		Radiative Loss, cal/min	840			
	Flask top Heat Loss, cal/min	1697		Flask bottom Heat Loss, cal/min	2672	4369		
	Reactor Temperature, C	**90.7**		P1 Gas Temp. Deg C.	**24.5**			
	Peroxide Temperature, F	76.5		Gas Flow Rate, gm/min	0.408			
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0120			
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	6.69			
	Peroxide Enthalpy Change, cal/min	126.7						
				Accumulation/Generation, cal/min	-1708			
	Correlated losses, cal/min	4608						
	Reflux Gas Delta H, cal/min	701						
	Revised Acc/generation, cal/min	-1023						

S Kujawa												
7/23/2003						**Reactor Charge**						
TEST RUN	**F-9**											
			SURROGATE			**Target**				**Actual**		
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
	Charge:				150							
water					120.0442	120.04			**120.346**			
hydraulic oil					2.0938	2.38			**2.040**			
cutting oil					2.0938	2.38			**2.046**			
IsoOctane									**none**			
Al2O3					0.3349	0.08	83.9		**0.3355**			
CaO					0.5413	0.16	163.0		**0.5409**			
Cr2O3					0.2326	0.04	44.6		**0.2330**			
Fe2O3					1.3032	0.44	435.1		**1.3033**			
MgO					0.7269	0.38	375.9		**0.7273**			
MnO					0.4254	0.08	82.1		**0.4258**			
SiO2					8.3907	3.71	3712.7		**8.3911**			
Na3PO4					12.2584	4.83	4831.8		**12.2580**			
KOH					0.3224	0.16	157.8		**0.3218**			
Hg					0.0516	0.00	3.8		0.054		**4**	
Aroclor-1260		Number of Vials:							**none**			
TCE					0.8431	0.58	577.5		0.847		**580**	
PCE					0.0747	0.05	45.8		0.075		**46**	
TCA					0.0941	0.07	70.2		0.094		**70**	
BEHP					0.1619	0.17	165.2		0.167		**170**	
	Total:				150.0	135.55			150			
			REAGENTS									
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
HCB					0.0056				**0.0060**			
BP					0.0029				**0.0035**			
FeSO4 7H2O					1.5				**1.5002**			
H2O2 (50%)					480	400			480	**400**		
H2SO4 (con)									**13.2572**			
NaOH (4 M)									**4.886**			
	Total:				631.5				650			

	S Kujawa													
	7/24/2003				Gas Phase Data/Calculations									
	TEST RUN	**F-9**												
	Results		**Gas Phase Calculations**											
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, F**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
9:00					**12.12**	31.3	0.077	0.000		0.000	0.000	0.0		
9:05					12.12	31.3	0.077	0.000	5.0	0.000	0.000	0.0		79.5
9:15	**50**	**15.04**	199	**73**	12.12	31.3	0.066	0.212	10.0	0.106	1.061	1.1		82.9
9:30	**50**	**10.44**	287	**73**	12.12	31.3	0.066	0.306	15.0	0.259	3.883	4.9		86.3
9:45	**50**	**8.85**	339	**73**	12.12	31.3	0.066	0.361	15.0	0.333	4.996	9.9		87.8
10:00	**50**	**8.22**	365	**80**	12.12	31.3	0.065	0.383	15.0	0.372	5.577	15.5		89
10:15	**50**	**8.16**	368	**86**	12.12	31.3	0.065	0.382	15.0	0.382	5.736	21.3		89.2
10:30	**50**	**8.15**	368	**83**	12.12	31.3	0.065	0.384	15.0	0.383	5.745	27.0		89.1
10:45	**50**	**7.31**	410	**80**	12.12	31.3	0.065	0.431	15.0	0.408	6.113	33.1		89.5
11:00	**50**	**7.29**	412	**88**	12.12	31.3	0.065	0.426	15.0	0.428	6.424	39.5		90
11:15	**50**	**7.31**	410	**86**	12.12	31.3	0.065	0.426	15.0	0.426	6.388	45.9		89.9
11:30	**50**	**6.78**	442	**86**	12.12	31.3	0.065	0.459	15.0	0.443	6.641	52.6		89.9
11:45	**50**	**6.81**	441	**87**	**12.16**	31.3	0.065	0.458	15.0	0.459	6.881	59.4		89.8
12:00	**50**	**6.66**	450	**93**	12.16	31.3	0.064	0.463	15.0	0.461	6.910	66.4		89.8
12:15	**50**	**6.82**	440	**90**	12.16	31.3	0.064	0.455	15.0	0.459	6.886	73.2		89.9
12:30	**50**	**7.4**	405	**88**	12.16	31.3	0.065	0.421	15.0	0.438	6.567	79.8		90.2
12:45	**50**	**8.47**	354	**90**	12.16	31.3	0.064	0.366	15.0	0.393	5.902	85.7		89.7
13:00	**50**	**10.69**	281	**90**	12.16	31.3	0.064	0.290	15.0	0.328	4.923	90.6		89.1
13:15	**50**	**11.82**	254	**90**	12.16	31.3	0.064	0.262	15.0	0.276	4.145	94.8		88.7
13:30	**50**	**12.12**	248	**85**	12.16	31.3	0.065	0.258	15.0	0.260	3.906	98.7		87.6
13:45	**50**	**16.91**	177	**95**	12.16	31.3	0.064	0.182	15.0	0.220	3.301	102.0		87
14:00	**50**	**19.34**	155	**95**	12.16	31.3	0.064	0.159	15.0	0.170	2.556	104.5		86.6
14:15	**50**	**20.87**	144	**94**	12.16	31.3	0.064	0.148	15.0	0.153	2.299	106.8		86.6
14:30	**50**	**26.62**	113	**90**	12.16	31.3	0.064	0.117	15.0	0.132	1.981	108.8		86.2
14:45	**20**	**12.34**	97	**94**	12.16	31.3	0.064	0.100	15.0	0.108	1.623	110.4		85.9
15:00	**10**	**8.31**	72	**91**	12.16	31.3	0.064	0.075	15.0	0.087	1.308	111.7		85.2
15:15	**10**	**9.66**	62	**91**	**12.13**	31.3	0.064	0.064	15.0	0.069	1.039	112.8		84.9
15:30	**10**	**12.44**	48	**91**	12.13	31.3	0.064	0.050	15.0	0.057	0.852	113.6		84.9
15:45	**10**	**16.87**	36	**93**	12.13	31.3	0.064	0.036	15.0	0.043	0.646	114.3		83.5
16:00	**10**	**25.47**	24	**93**	12.13	31.3	0.064	0.024	15.0	0.030	0.455	114.7		83.2
16:15	**5**	**18.63**	16	**89**	12.13	31.3	0.064	0.017	15.0	0.020	0.306	115.0		82.8
16:30	**5**	**18.5**	16	**87**	12.13	31.3	0.065	0.017	15.0	0.017	0.251	115.3		82.9
16:45	**5**	**17.54**	17	**92**	12.13	31.3	0.064	0.018	15.0	0.017	0.258	115.6		83.3
17:00	**10**	**46.88**	13	**87**	12.13	31.3	0.065	0.013	15.0	0.015	0.231	115.8		83.6
							Avg's:	0.228	480.0			109.6	Avg:	86.8
	the percents and PPMv below are dummy numbers pending GC/MS results													
Run Time	**% O2**	**% CO2**	**% H2O**	**% CO**	**PPMv TCE**	**PPMv PCE**	**PPMv TCA**	**MW**						
9:45	95%	0%	5%	0%	5	5	5	31.3						

S Kujawa									
7/23/2003				**Test Results**	Str RPM:	**288**			
TEST RUN	**F-9**								
	Results								
	Product slurry Sp. Gr.:	1.04							
	Final Product Slurry, ml:	**500**							
	Final Product Slurry, gm:	**520.8**							
	Dewar Flask net wt., gm	**0.9756**							
	Liquid/slurry Product, gm:	521.8		(Slurry Wt, 100% H2O2/O2 RXN):	537				
	Product Gas Weight, gm:	115.8							
	Product Wt, gm:	637.6							
	Total Charge Weight, gm:	**650**							
	Overall Mass Balance								
	Mass Balance Closure:	98.1%							
	Mass balance w/o gas:	80%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene			HexachloroBenzene					
	Slurry, mg/kg:	**2**	Less Than						
	Gas Phase, mg:	0.00E+00							
	Dewar, mg:								
	Slurry, mg:	1.0416		slurry ,mg:	tbd				
	Total, mg:	1.04E+00							
	TCE, DRE, %	99.88%		HCB, DRE, %	#VALUE!				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry, mg/kg:	**2**	Less Than						
	Gas Phase, mg:	0.00E+00							
	Dewar, mg:								
	Slurry, mg:	2.00E+00		slurry ,mg:	tbd				
	Total, mg:	2.00E+00					Run time:	8	Hours
							Run Temp:	86.3	deg C
	PCE, DRE, %	97.33%		BP, DRE, %	#VALUE!		H2O2 vol:	400	ml
	1,1,1-TriChloroEthane			Aroclor 1260					
	Slurry, mg/kg:	**2**	Less Than						
	Gas Phase, mg:	0.00E+00							
	Dewar, mg:								
	Slurry, mg:	2.00E+00		slurry ,mg:					
	Total, mg:	2.00E+00							
	TCA, DRE, %	97.87%		Aroclor, DRE, %	#VALUE!				
	BEHP								
	Slurry, mg:	TBD							
		tbd							
	BEHP, DRE, %	#VALUE!							

S Kujawa				**Heat Balance**					
7/29/2003									
TEST RUN	**F-9**						numbers in red are questionable.		
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**				
							Since only one data point on return temperatures was collected for this run, and was collected before peroxide injection, this point provides another estimate of the overall heat loss and heat transfer coefficient, only.		
Time				Boss DS oil density, gm/ml	0.873				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
8:40	Water Return Temp, Deg F	**46**		Oil Return Temp, Deg C	**76.9**				
	bucket ck volume, ml	1000		bucket ck volume, ml	**100**				
	Bucket ck time, sec	28.5		Bucket ck time, sec	**9.87**				
	Flow rate, ml/min	2105		Flow rate, ml/min	608				
	Enthalpy change, calorie/min:	5848		Enthalpy change, calorie/min:	-4904				
	Flask Top Surface Temp., F	148		Flask bottom Surface Temp., F	170				
	Air Temp. ,F	73		Air Temp. ,F	72				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1131		Convective Loss, cal/min	2272				
	Radiative Loss, cal/min	494		Radiative Loss, cal/min	964				
	Flask top Heat Loss, cal/min	1625		Flask bottom Heat Loss, cal/min	3236	4861			
	Reactor Temperature, C	**79.5**		P1 Gas Temp. Deg C.	31				
	Peroxide Temperature, F	73		Gas Flow Rate, gm/min	0.000		Correlated losses, cal/min	4176	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0000		Reflux Gas Delta H, cal/min	0	
	Peroxide heat Cap, cal/gm/de	0.8		P1 loss, H2O vapor, cal/min	0.00		Revised Acc/generation, cal/min	728	
	Peroxide Enthalpy Change, ca	0.0							
				Accumulation/Generation, cal/min	-5805				
	8/8/2003:								
	All heat transfer calculations are to be considered incorrect due to uncertainty of the condenser water flow rates through run F-6.								

	S Kujawa												
	7/23/2003						Reactor Charge						
	TEST RUN	**F-8**											
				SURROGATE			**Target**					**Actual**	
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
		Charge:				150							
	water					120.0442	120.04			**102.236**			
	hydraulic oil					2.0938	2.38			**2.067**			
	cutting oil					2.0938	2.38			**1.958**			
	IsoOctane									**none**			
	Al2O3					0.3349	0.08	83.9		**0.3357**			
	CaO					0.5413	0.16	163.0		**0.5409**			
	Cr2O3					0.2326	0.04	44.6		**0.2332**			
	Fe2O3					1.3032	0.44	435.1		**1.3035**			
	MgO					0.7269	0.38	375.9		**0.7270**			
	MnO					0.4254	0.08	82.1		**0.4250**			
	SiO2					8.3907	3.71	3712.7		**8.3898**			
	Na3PO4					12.2584	4.83	4831.8		**12.2587**			
	KOH					0.3224	0.16	157.8		**0.3221**			
	Hg					0.0516	0.00	3.8		0.054		**4**	
	Aroclor-1260		Number of Vials:							**none**			
	TCE					0.8431	0.58	577.5		0.847		**580**	
	PCE					0.0747	0.05	45.8		0.075		**46**	
	TCA					0.0941	0.07	70.2		0.094		**70**	
	BEHP					0.1619	0.17	165.2		0.167		**170**	
		Total:				150.0	135.55			132			
				REAGENTS									
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
	HCB					0.0056				**0.0065**			
	BP					0.0029				**0.0034**			
	FeSO4 7H2O					1.5				**1.4987**			
	H2O2 (50%)					600	500			600	**500**		
	H2SO4 (con)									**12.2109**			
	NaOH (4 M)									**2.905**			
		Total:				751.5				749			

S Kujawa
7/24/2003

Gas Phase Data/Calculations

TEST RUN **F-8**

Results **Gas Phase Calculations**

Run Time	Gas Vol, cc	Time, sec	accm	Temp, F	P baro	MW	Density	gm/min	Time delta	Rate avg	Mass delta	Mass sum		Rctr T
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
9:45				**78**	12.16	31.3	0.066	0.000		0.000	0.000	0.0		
9:50	**50**	**27.25**	110	**78**	12.16	31.3	0.066	0.116	5.0	0.058	0.291	0.3		79.4
10:00	**50**	**12.37**	243	**78**	**12.16**	31.3	0.066	0.256	10.0	0.186	1.864	2.2		82.0
10:15	**50**	**8.37**	358	**78**	12.16	31.3	0.066	0.379	15.0	0.318	4.764	6.9		85.8
10:30	**50**	**6.65**	451	**78**	12.16	31.3	0.066	0.477	15.0	0.428	6.418	13.3		87.6
10:45	**50**	**6.31**	475	**81**	12.16	31.3	0.066	0.500	15.0	0.488	7.325	20.7		88.3
11:00	**50**	**5.87**	511	**87**	12.16	31.3	0.065	0.531	15.0	0.516	7.734	28.4		88.6
11:15	**50**	**5.85**	513	**87**	12.16	31.3	0.065	0.533	15.0	0.532	7.984	36.4		88.8
11:30	**50**	**5.53**	542	**87**	12.16	31.3	0.065	0.564	15.0	0.549	8.229	44.6		88.8
11:45	**50**	**5.9**	508	**89**	12.16	31.3	0.065	0.527	15.0	0.545	8.181	52.8		89.4
12:00	**50**	**6.16**	487	**89**	12.16	31.3	0.065	0.505	15.0	0.516	7.734	60.5		89.6
12:15	**50**	**6.63**	452	**90**	12.16	31.3	0.064	0.468	15.0	0.486	7.293	67.8		89.5
12:30	**50**	**6.47**	464	**91**	12.16	31.3	0.064	0.479	15.0	0.473	7.099	74.9		89.5
12:45	**50**	**6.63**	452	**92**	12.16	31.3	0.064	0.466	15.0	0.472	7.086	82.0		89.2
13:00	**50**	**5.9**	508	**93**	12.16	31.3	0.064	0.523	15.0	0.495	7.418	89.4		89.1
13:15	**50**	**6.16**	487	**93**	12.16	31.3	0.064	0.501	15.0	0.512	7.678	97.1		89.0
13:30	**50**	**6.34**	473	**93**	12.16	31.3	0.064	0.487	15.0	0.494	7.406	104.5		89.1
13:45	**50**	**5.94**	505	**93**	12.16	31.3	0.064	0.519	15.0	0.503	7.545	112.1		89.2
14:00	**50**	**8.56**	350	**94**	12.16	31.3	0.064	0.360	15.0	0.440	6.594	118.6		89.2
14:15	**50**	**9.87**	304	**90**	12.16	31.3	0.064	0.314	15.0	0.337	5.056	123.7		88.7
14:30	**50**	**13.97**	215	**90**	12.16	31.3	0.064	0.222	15.0	0.268	4.023	127.7		88.1
14:45	**50**	**38.53**	78	**91**	12.16	31.3	0.064	0.080	15.0	0.151	2.268	130.0		86.9
15:00	**50**	**50.66**	59	**91**	12.16	31.3	0.064	0.061	15.0	0.071	1.061	131.1		86.9
15:15	**50**	**42.12**	71	**91**	12.16	31.3	0.064	0.074	15.0	0.067	1.010	132.1		85.9
15:30	**2**	**7.85**	15	**92**	12.16	31.3	0.064	0.016	15.0	0.045	0.669	132.7		85.5
15:45	**1.5**	**8.34**	11	**92**	12.16	31.3	0.064	0.011	15.0	0.013	0.202	132.9		84.5
16:00	**0**					31.3	0.000	0.000	15.0	0.006	0.083	133.0		84.2
16:15	**0**					31.3	0.000	0.000	15.0	0.000	0.000	133.0		83.8
16:30	**0**					31.3	0.000	0.000	15.0	0.000	0.000	133.0		83.5
16:45	**0**					31.3	0.000	0.000	15.0	0.000	0.000	133.0		83.0
17:00	**0**					31.3	0.000	0.000	15.0	0.000	0.000	133.0		83.0
17:15	**0**								15.0	0.000	0.000	133.0		83.2
17:30	**0**					31.3	0.000	0.000	15.0	0.000	0.000	133.0		83.3
17:45	**0**					31.3	0.000	0.000	15.0	0.000	0.000	133.0		83.3
								0.272	480.0			130.5		86.5

the percents and PPMv below are dummy numbers pending GC/MS results

Run Time	% O2	% CO2	% H2O	% CO	PPMv TCE	PPMv PCE	PPMv TCA	MW
9:45	95%	0%	5%	0%	5	5	5	31.3

S Kujawa										
7/23/2003				**Test Results**			Str RPM:	**480**		
TEST RUN	**F-8**									
	Results									
	Product slurry Sp. Gr.:	1.04								
	Final Product Slurry, ml:	**567**								
	Final Product Slurry, gm	**589**								
	Dewar Flask net wt., gm	**0.9865**								
	Liquid/slurry Product, gm	590.0		(Slurry Wt, 100% H2O2/O2 RXN):	607					
	Product Gas Weight, gm	133.0								
	Product Wt, gm:	723								
	Total Charge Weight, gm:	**749**								
	Overall Mass Balance									
	Mass Balance Closure:	96.6%								
	Mass balance w/o gas:	79%								
	Species Mass Results			**Species Mass Results**						
	TriChloroEthylene			HexachloroBenzene						
	Slurry, mg/kg:	**2**	Less Than							
	Gas Phase, mg:									
	Dewar, mg:									
	Slurry, mg:	1.178		slurry ,mg:	tbd					
	Total, mg:	1.18E+00								
	TCE, DRE, %	99.86%		HCB, DRE, %	#VALUE!					
	TetraChloroEthylene			Bi-Phenyl						
	Slurry, mg/kg:	**2**	Less Than							
	Gas Phase, mg:									
	Dewar, mg:									
	Slurry, mg:	1.178		slurry ,mg:	tbd					
	Total, mg:	1.18E+00						Run time:		8 Hours
								Run Temp:		86.5 deg C
	PCE, DRE, %	98.43%		BP, DRE, %	#VALUE!			H2O2 vol:		500 ml
	1,1,1-TriChloroEthane			Aroclor 1260						
	Slurry, mg/kg:	**2**	Less Than							
	Gas Phase, mg:									
	Dewar, mg:									
	Slurry, mg:	1.178		slurry ,mg:						
	Total, mg:	1.18E+00								
	TCA, DRE, %	98.74%		Aroclor, DRE, %	#VALUE!					
	BEHP									
	Slurry, mg:	TBD								
		tbd								
	BEHP, DRE, %	#VALUE!								
	8/8/2003:									
	All heat transfer calculations are to be considered incorrect due to uncertainty of the condenser water flow rates during the runs through run F-6.									
							numbers in red are questionable			

S Kujawa									
7/28/2003				**Heat Balance**					
TEST RUN	**F-8**								
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**				
Time				Boss DS oil density, gm/ml	0.873				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
10:30	Water Return Temp, Deg F	**48**		Oil Return Temp, Deg C	**80.9**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**16.75**		Bucket ck time, sec	**9.53**				
	Flow rate, ml/min	358		Flow rate, ml/min	630				
	Enthalpy change, calorie/min:	1393		Enthalpy change, calorie/min:	-4199				
	Flask Top Surface Temp., F	168		Flask bottom Surface Temp., F	168				
	Air Temp. ,F	78		Air Temp. ,F	78				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1357		Convective Loss, cal/min	2087				
	Radiative Loss, cal/min	634		Radiative Loss, cal/min	893				
	Flask top Heat Loss, cal/min	1991		Flask bottom Heat Loss, cal/min	2980	4971			
	Reactor Temperature, C	**87.6**		P1 Gas Temp. Deg C.	31				
	Peroxide Temperature, F	78		Gas Flow Rate, gm/min	0.477		Correlated losses, cal/min	4176	
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0140		Reflux Gas Delta H, cal/min	819	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	7.76		Revised Acc/generation, cal/min	-915	
	Peroxide Enthalpy Change, cal/min	119.1							
				Accumulation/Generation, cal/min	-2291				
13:25	Water Return Temp, Deg F	**47.7**		Oil Return Temp, Deg C	**80.9**				
	bucket ck volume, ml	100		bucket ck volume, ml	100				
	Bucket ck time, sec	16.75		Bucket ck time, sec	9.53				
	Flow rate, ml/min	358		Flow rate, ml/min	630				
	Enthalpy change, calorie/min:	1333		Enthalpy change, calorie/min:	-4199				
	Flask Top Surface Temp., F	170		Flask bottom Surface Temp., F	170				
	Air Temp. ,F	93		Air Temp. ,F	93				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1267		Convective Loss, cal/min	1785				
	Radiative Loss, cal/min	565		Radiative Loss, cal/min	797				
	Flask top Heat Loss, cal/min	1832		Flask bottom Heat Loss, cal/min	2582	4414			
	Reactor Temperature, C	**89**		P1 Gas Temp. Deg C.	31				
	Peroxide Temperature, F	93		Gas Flow Rate, gm/min	0.487		Correlated losses, cal/min	4176	
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0140		Reflux Gas Delta H, cal/min	836	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	7.76		Revised Acc/generation, cal/min	-918	
	Peroxide Enthalpy Change, cal/m	105.8							
				Accumulation/Generation, cal/min	-1662				
15:25	Water Return Temp, Deg F	**49.3**		Oil Return Temp, Deg C	**79.7**				
	bucket ck volume, ml	100		bucket ck volume, ml	100				
	Bucket ck time, sec	16.75		Bucket ck time, sec	9.59				
	Flow rate, ml/min	358		Flow rate, ml/min	626				
	Enthalpy change, calorie/min:	1652		Enthalpy change, calorie/min:	-4435				
	Flask Top Surface Temp., F	169		Flask bottom Surface Temp., F	169				
	Air Temp. ,F	91		Air Temp. ,F	91				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1283		Convective Loss, cal/min	1809				
	Radiative Loss, cal/min	568		Radiative Loss, cal/min	801				
	Flask top Heat Loss, cal/min	1851		Flask bottom Heat Loss, cal/min	2610	4461			
	Reactor Temperature, C	**85.9**		P1 Gas Temp. Deg C.	31				
	Peroxide Temperature, F	91		Gas Flow Rate, gm/min	0.016		Correlated losses, cal/min	4176	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0143		Reflux Gas Delta H, cal/min	27	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	7.92		Revised Acc/generation, cal/min	232	
	Peroxide Enthalpy Change, cal/m	0.0							
				Accumulation/Generation, cal/min	-1686				

	S Kujawa												
	7/30/2003						Reactor Charge						
	TEST RUN	**F-9A**											
				SURROGATE			**Target**				**Actual**		
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
		Charge:				150							
	water					120.0442	120.04			**120.094**			
	hydraulic oil					2.0938	2.38			**2.082**			
	cutting oil					2.0938	2.38			**2.163**			
	IsoOctane									**none**			
	Al2O3					0.3349	0.08	83.9		**0.3350**			
	CaO					0.5413	0.16	163.0		**0.5408**			
	Cr2O3					0.2326	0.04	44.6		**0.2331**			
	Fe2O3					1.3032	0.44	435.1		**1.3030**			
	MgO					0.7269	0.38	375.9		**0.7275**			
	MnO					0.4254	0.08	82.1		**0.4249**			
	SiO2					8.3907	3.71	3712.7		**8.3908**			
	Na3PO4					12.2584	4.83	4831.8		**12.2583**			
	KOH					0.3224	0.16	157.8		**0.3230**			
	Hg					0.0516	0.00	3.8		**0.0514**		4	
	Aroclor-1260		Number of Vials:							**none**			
	TCE					0.8431	0.58	577.5		**0.8595**		580	
	PCE					0.0747	0.05	45.8		**0.0748**		46	
	TCA					0.0941	0.07	70.2		**0.0981**		70	
	BEHP					0.1619	0.17	165.2		**0.1633**		170	
		Total:				150.0	135.55			150.1			
				REAGENTS									
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
	HCB					0.0056				**0.0058**			
	BP					0.0029				**0.0030**			
	FeSO4 7H2O					1.5				**1.5007**			
	H2O2 (50%)					600	500			600	**500**		
	H2SO4 (con)									**13.068**			
	NaOH (4 M)									**7.678**			
		Total:				751.5				772			

S Kujawa
7/29/2003

Gas Phase Data/Calculations

TEST RUN **F-9A**

Results **Gas Phase Calculations**

Run Time	Gas Vol, cc	Time, sec	accm	Temp, F	P baro	MW	Density	gm/min	Time delta	Rate avg	Mass delta	Mass sum		Rctr T
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
9:45	0	1	0	76	12.08	31.3	0.066	0.000		0.000	0.000	0.0		81.6
9:50	0	1	170	76	12.08	31.3	0.066	0.179	5.0	0.089	0.447	0.4		81.3
10:00	0	1	339	76	12.16	31.3	0.066	0.360	10.0	0.269	2.692	3.1		85
10:15	50	8.84	339	76	12.16	31.3	0.066	0.360	15.0	0.360	5.398	8.5		88.6
10:30	50	8.78	342	76	12.16	31.3	0.066	0.363	15.0	0.361	5.420	14.0		87.8
10:45	50	8.94	336	76	12.16	31.3	0.066	0.356	15.0	0.359	5.390	19.3		87.7
11:00	50	8.75	343	78	12.16	31.3	0.066	0.362	15.0	0.359	5.389	24.7		87.2
11:15	50	8.28	362	78	12.16	31.3	0.066	0.383	15.0	0.373	5.591	30.3		87.5
11:30	50	7.97	376	79	12.16	31.3	0.066	0.397	15.0	0.390	5.851	36.2		87.8
11:45	50	7.18	418	80	12.16	31.3	0.066	0.440	15.0	0.419	6.279	42.5		88.3
12:00	50	6.94	432	80	12.16	31.3	0.066	0.455	15.0	0.448	6.715	49.2		88.7
12:15	50	6.59	455	81	12.16	31.3	0.066	0.479	15.0	0.467	7.004	56.2		89.1
12:30	50	6.09	493	82	12.16	31.3	0.065	0.517	15.0	0.498	7.466	63.6		89.5
12:45	50	6.35	472	82	12.16	31.3	0.065	0.496	15.0	0.506	7.595	71.2		89.3
13:00	50	6.16	487	83	12.16	31.3	0.065	0.510	15.0	0.503	7.544	78.8		89.5
13:15	50	5.78	519	84	12.16	31.3	0.065	0.543	15.0	0.526	7.895	86.7		89.6
13:30	50	6.06	495	84	12.16	31.3	0.065	0.518	15.0	0.530	7.951	94.6		89.4
13:45	50	5.88	510	84	12.16	31.3	0.065	0.533	15.0	0.525	7.882	102.5		89.4
14:00	50	6.41	468	85	12.16	31.3	0.065	0.488	15.0	0.511	7.663	110.2		89.8
14:15	50	7.53	398	86	12.16	31.3	0.065	0.415	15.0	0.452	6.775	116.9		89.3
14:30	50	9.31	322	85	12.16	31.3	0.065	0.336	15.0	0.376	5.634	122.6		88.8
14:45	50	10.88	276	85	12.16	31.3	0.065	0.288	15.0	0.312	4.680	127.3		88.3
15:00	50	12.78	235	86	12.16	31.3	0.065	0.245	15.0	0.266	3.992	131.3		87.7
15:15	50	14.56	206	86	12.16	31.3	0.065	0.215	15.0	0.230	3.443	134.7		87.4
15:30	50	17.82	168	86	12.16	31.3	0.065	0.175	15.0	0.195	2.925	137.6		86.8
15:45	50	22.71	132	86	12.16	31.3	0.065	0.138	15.0	0.156	2.347	140.0		86.3
16:00	50	32.2	93	86	12.16	31.3	0.065	0.097	15.0	0.117	1.760	141.7		85.9
16:15	0	1	0	86	12.16	31.3	0.065	0.000	15.0	0.049	0.728	142.5		85.3
16:30	0	1	0	86	12.16	31.3	0.065	0.000	15.0	0.000	0.000	142.5		84.6
16:45	5	7.25	41	86	12.16	31.3	0.065	0.043	15.0	0.022	0.323	142.8		84.4
17:00	0	1	0	86	12.16	31.3	0.065	0.000	15.0	0.022	0.323	143.1		83.9
17:15	0	1	0	86	12.16	31.3	0.065	0.000	15.0	0.000	0.000	143.1		83.5
17:30	0	1	0	86	12.16	31.3	0.065	0.000	15.0	0.000	0.000	143.1		83.1
17:45	0	1	0	87	12.16	31.3	0.065	0.000	15.0	0.000	0.000	143.1		82.9
							Avg's:	0.285	480.0			136.8	Avg:	86.9

S Kujawa									
7/30/2003				**Test Results**	Str RPM:	**420**	Start		
TEST RUN	**F-9A**								
	Results								
	Product slurry Sp. Gr.:	1.03							
	Final Product Slurry, ml:	**600**							
	Final Product Slurry, gm:	**618.1**							
	Dewar Flask net wt., gm	**1.0353**							
	Liquid/slurry Product, gm:	619.1		(Slurry Wt, 100% H2O2/O2 RXN):	631				
	Product Gas Weight, gm:	143.1		**Gas Results are "Somewhat" dummy numbers pending analyses**					
	Product Wt, gm:	762.2							
	Total Charge Weight, gm:	**772**							
	Overall Mass Balance								
	Mass Balance Closure:	98.7%							
	Mass balance w/o gas:	80%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene	**NOTE**	Anal. code			
	Slurry analysis, 1, mg/kg:	1.890	U	Slurry analysis, 1, mg/kg:	4.420	U			
	Slurry analysis, 2, mg/kg:	1.930	U	Slurry analysis, 2, mg/kg:	4.410	U			
	Avg., mg/kg	1.910		Avg., mg/kg	4.415				
	Total, mg:	1.181		Total, mg:	2.729				
	TCE, DRE, %	99.86%		HCB, DRE, %	52.95%				
	TetraChloroEthylene			Bi-Phenyl	**NOTE**				
	Slurry analysis, 1, mg/kg:	1.890	U	Slurry analysis, 1, mg/kg:	4.420	U			
	Slurry analysis, 2, mg/kg:	1.930	U	Slurry analysis, 2, mg/kg:	4.410	U			
	Avg., mg/kg	1.910		Avg., mg/kg	4.415				
	Total, mg:	1.181		Total, mg:	2.729				
	PCE, DRE, %	98.42%		BP, DRE, %	9.04%		Run time:	8	Hours
							Run Temp:	86.9	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	500	ml
	Slurry analysis, 1, mg/kg:	1.890	U	Slurry analysis, 1, mg/kg:	0.000				
	Slurry analysis, 2, mg/kg:	1.930	U	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	1.910		Avg., mg/kg	0.000				
	Total, mg:	1.181		Total, mg:	0.000				
	TCA, DRE, %	98.80%		Aroclor, DRE, %	#VALUE!				
	BEHP	**NOTE**							
	Slurry analysis, 1, mg/kg:	26.400							
	Slurry analysis, 2, mg/kg:	20.600							
	Avg., mg/kg	23.500							
	Total, mg:	14.525							
	BEHP, DRE, %	91.11%							

	8/8/2003:								
	All heat transfer calculations are to be considered incorrect due to uncertainty of the condenser water flow rates during the runs through run F-6.								

S Kujawa				**Heat Balance**					
7/30/2003									
TEST RUN	**F-9A**				numbers in red are questionable.				
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**				
Time				Boss DS oil density, gm/ml	0.873				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
11:32	Water Return Temp, Deg C	**8.2**		Oil Return Temp, Deg C	**76.4**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**17.97**		Bucket ck time, sec	**9.94**				
	Flow rate, ml/min	334		Flow rate, ml/min	604				
	Enthalpy change, calorie/min:	1068		Enthalpy change, calorie/min:	-4975				
	Flask Top Surface Temp., C	**73.6**		Flask bottom Surface Temp., C	**79.3**				
	Flask Top Surface Temp., F	164		Flask bottom Surface Temp., F	175				
	Air Temp. ,F	**79**		Air Temp. ,F	**79**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1289		Convective Loss, cal/min	2035				
	Radiative Loss, cal/min	598		Radiative Loss, cal/min	970				
	Flask top Heat Loss, cal/min	1887		Flask bottom Heat Loss, cal/min	3005	4891			
	Reactor Temperature, C	**87.8**		P1 Gas Temp. Deg C.	**27**				
	Peroxide Temperature, F	79		Gas Flow Rate, gm/min	0.390		Correlated losses, cal/min	4442	
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0115		Reflux Gas Delta H, cal/min	670	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	6.39		Revised Acc/generation, cal/min	-255	
	Peroxide Enthalpy Change, cal/min	118.4							
				Accumulation/Generation, cal/min	-1110				
12:51	Water Return Temp, Deg C	**8.2**		Oil Return Temp, Deg C	**77.7**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**17.72**		Bucket ck time, sec	**10.09**				
	Flow rate, ml/min	339		Flow rate, ml/min	595				
	Enthalpy change, calorie/min:	1084		Enthalpy change, calorie/min:	-4631				
	Flask Top Surface Temp., C	**74.6**		Flask bottom Surface Temp., C	**79.9**				
	Flask Top Surface Temp., F	166		Flask bottom Surface Temp., F	176				
	Air Temp. ,F	**83**		Air Temp. ,F	**83**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1370		Convective Loss, cal/min	2152				
	Radiative Loss, cal/min	591		Radiative Loss, cal/min	952				
	Flask top Heat Loss, cal/min	1961		Flask bottom Heat Loss, cal/min	3104	5065			
	Reactor Temperature, C	**89.5**		P1 Gas Temp. Deg C.	**29**				
	Peroxide Temperature, F	83		Gas Flow Rate, gm/min	0.503		Correlated losses, cal/min	4309	
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0148		Reflux Gas Delta H, cal/min	863	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	8.24		Revised Acc/generation, cal/min	-659	
	Peroxide Enthalpy Change, cal/min	117.4							
				Accumulation/Generation, cal/min	-1644				

15:05	Water Return Temp, Deg C	**8.2**		Oil Return Temp, Deg C	**78**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**17.44**		Bucket ck time, sec	**10.06**				
	Flow rate, ml/min	344		Flow rate, ml/min	596				
	Enthalpy change, calorie/min:	1101		Enthalpy change, calorie/min:	-4582				
	Flask Top Surface Temp., C	**75.6**		Flask bottom Surface Temp., C	**80.4**				
	Flask Top Surface Temp., F	168		Flask bottom Surface Temp., F	177				
	Air Temp. ,F	**86**		Air Temp. ,F	**86**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1350		Convective Loss, cal/min	2104				
	Radiative Loss, cal/min	589		Radiative Loss, cal/min	939				
	Flask top Heat Loss, cal/min	1940		Flask bottom Heat Loss, cal/min	3043	4983			
	Reactor Temperature, C	**87.7**		P1 Gas Temp. Deg C.	**31.5**				
	Peroxide Temperature, F	86		Gas Flow Rate, gm/min	0.498		Correlated losses, cal/min	4143	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.2296		Reflux Gas Delta H, cal/min	855	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	127.41		Revised Acc/generation, cal/min	-415	
	Peroxide Enthalpy Change, cal/min	0.0							
				Accumulation/Generation, cal/min	-1629				

S Kujawa	**F-9A**								
7/30/2003									
17:23	Water Return Temp, Deg C	**8.9**		Oil Return Temp, Deg C	**77.7**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**18.06**		Bucket ck time, sec	**9.75**				
	Flow rate, ml/min	332		Flow rate, ml/min	615				
	Enthalpy change, calorie/min:	1296		Enthalpy change, calorie/min:	-4792				
	Flask Top Surface Temp., C	**70.4**		Flask bottom Surface Temp., C	**79.4**				
	Flask Top Surface Temp., F	159		Flask bottom Surface Temp., F	175				
	Air Temp. ,F	**87**		Air Temp. ,F	**87**				
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1180		Convective Loss, cal/min	2039				
	Radiative Loss, cal/min	503		Radiative Loss, cal/min	908				
	Flask top Heat Loss, cal/min	1683		Flask bottom Heat Loss, cal/min	2947	4630			
	Reactor Temperature, C	**83.1**		P1 Gas Temp. Deg C.	**31**				
	Peroxide Temperature, F	87		Gas Flow Rate, gm/min	0.530		Correlated losses, cal/min	4176	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0000		Reflux Gas Delta H, cal/min	910	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.00		Revised Acc/generation, cal/min	-294	
	Peroxide Enthalpy Change, cal/min	0.0							
				Accumulation/Generation, cal/min	-1134				

	S Kujawa												
	8/5/2003					**Reactor Charge**							
	TEST RUN	**F-10**											
				SURROGATE			**Target**				**Actual**		
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
		Charge:				150							
	water					120.0442	120.04			**120.615**			
	hydraulic oil					2.0938	2.38			**1.921**			
	cutting oil					2.0938	2.38			**2.104**			
	Al2O3					0.3349	0.08	83.9		**0.334**			
	CaO					0.5413	0.16	163.0		**0.541**			
	Cr2O3					0.2326	0.04	44.6		**0.233**			
	Fe2O3					1.3032	0.44	435.1		**1.304**			
	MgO					0.7269	0.38	375.9		**0.726**			
	MnO					0.4254	0.08	82.1		**0.425**			
	SiO2					8.3907	3.71	3712.7		**8.390**			
	Na3PO4					12.2584	4.83	4831.8		**12.259**			
	KOH					0.3224	0.16	157.8		**0.321**			
	Hg					0.0516	0.00	3.8		**0.0554**		4	
	Aroclor-1260									**none**			
	TCE					0.8431	0.58	577.5		**0.8529**	TCE	580	
	PCE					0.0747	0.05	45.8		**0.0747**	PCE	46	
	TCA					0.0941	0.07	70.2		**0.0957**	TCA	70	
	BEHP					0.1619	0.17	165.2		**0.1731**	BEHP	170	
		Total:				150.0	135.55			150.4			
				REAGENTS									
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
	HCB					0.0056				**0.006**	HCB		
	BP					0.0029				**0.003**	BP		
	FeSO4 7H2O					1.5				**1.498**			
	H2O2 (50%)					480	400			480	**400**		
	H2SO4 (con)									**11.9441**			
	NaOH (4 M)									**3.549**			
		Total:				631.5				647			

S Kujawa
8/5/2003

Gas Phase Data/Calculations

TEST RUN **F-10**

	Results		**Gas Phase Calculations**											
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, C**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
9:00	0	1	0	**20.5**	**12.07**	31.3	0.067	0.000		0.000	0.000	0.0		**84**
9:05	**0**	1	0	**20.5**	**12.07**	31.3	0.067	0.000	5.0	0.000	0.000	0.0		**84.8**
9:15	**50**	**7.69**	390	**20.5**	**12.07**	31.3	0.067	0.417	10.0	0.208	2.084	2.1		**90.2**
9:30	**50**	**7.16**	419	**20.5**	**12.07**	31.3	0.067	0.448	15.0	0.432	6.484	8.6		**91.7**
9:45	**50**	6.94	432	**21**	**12.07**	31.3	0.067	0.461	15.0	0.454	6.816	15.4		**92.3**
10:00	**50**	**6.97**	430	**22**	**12.07**	31.3	0.066	0.458	15.0	0.459	6.890	22.3		**92.9**
10:15	**50**	**9.5**	316	**23**	**12.07**	31.3	0.066	0.335	15.0	0.396	5.946	28.2		**92.8**
10:30	**50**	**8.34**	360	**23**	**12.07**	31.3	0.066	0.381	15.0	0.358	5.372	33.6		**91.6**
10:45	**50**	**8.19**	366	**23**	**12.07**	31.3	0.066	0.388	15.0	0.385	5.769	39.4		**92**
11:00	**50**	**7.79**	385	**23**	**12.07**	31.3	0.066	0.408	15.0	0.398	5.971	45.3		**92.2**
11:15	**50**	**7.68**	391	**24**	**12.07**	31.3	0.066	0.413	15.0	0.411	6.159	51.5		**92.4**
11:30	**50**	**7.16**	419	**25**	**12.07**	31.3	0.066	0.441	15.0	0.427	6.406	57.9		**92.5**
11:45	**50**	**7.15**	420	**25**	**12.07**	31.3	0.066	0.442	15.0	0.441	6.619	64.5		**92.9**
12:00	**50**	**7.38**	407	**25**	**12.07**	31.3	0.066	0.428	15.0	0.435	6.520	71.0		**93.2**
12:15	**50**	**6.9**	435	**25**	**12.07**	31.3	0.066	0.458	15.0	0.443	6.640	77.7		**93.1**
12:30	**50**	**7.25**	414	**25**	**12.07**	31.3	0.066	0.435	15.0	0.447	6.698	84.4	**H2O2::0**	**93.8**
12:45	**50**	**8.75**	343	**26**	**12.07**	31.3	0.066	0.360	15.0	0.398	5.968	90.3		**93.4**
13:00	**50**	**10.81**	278	**26**	**12.07**	31.3	0.065	0.291	15.0	0.326	4.885	95.2		**92.7**
13:15	**50**	**13.34**	225	**27**	**12.07**	31.3	0.065	0.235	15.0	0.263	3.946	99.2		**92.1**
13:30	**50**	**16.75**	179	**27**	**12.07**	31.3	0.065	0.187	15.0	0.211	3.167	102.3		**91.7**
13:45	**50**	**19.68**	152	**28**	**12.07**	31.3	0.065	0.159	15.0	0.173	2.595	104.9		**91.3**
14:00	**50**	**29.37**	102	**27**	**12.07**	31.3	0.065	0.107	15.0	0.133	1.992	106.9		**89.4**
14:15	**50**	**36.56**	82	**29**	**12.07**	31.3	0.065	0.085	15.0	0.096	1.440	108.4		**88.3**
14:30	**50**	**44.31**	68	**30**	**12.07**	31.3	0.065	0.070	15.0	0.078	1.166	109.5		**87.7**
14:45	**50**	**49.47**	61	**30**	**12.07**	31.3	0.065	0.063	15.0	0.067	0.998	110.5		**87.6**
15:00	**10**	**12.5**	48	**30**	**12.07**	31.3	0.065	0.050	15.0	0.056	0.844	111.4		**87.3**
15:15	**10**	**13.41**	45	**30**	**12.07**	31.3	0.065	0.046	15.0	0.048	0.720	112.1		**86.9**
15:30	**10**	**18.5**	32	**29**	**12.07**	31.3	0.065	0.034	15.0	0.040	0.600	112.7		**86.7**
15:45	**10**	**21.6**	28	**29**	**12.07**	31.3	0.065	0.029	15.0	0.031	0.469	113.2		**86.3**
16:00	**5**	**17.1**	18	**29**	**12.07**	31.3	0.065	0.018	15.0	0.024	0.353	113.5		**85.8**
16:15	**10**	**32.03**	19	**27**	**12.07**	31.3	0.065	0.020	15.0	0.019	0.284	113.8		**85.4**
16:30	**5**	**19.97**	15	**27**	**12.07**	31.3	0.065	0.016	15.0	0.018	0.265	114.1		**85.1**
16:45	**5**	**28.85**	10	**26**	**12.07**	31.3	0.065	0.011	15.0	0.013	0.200	114.3		**85.1**
17:00	**5**	**31.5**	10	**26**	**12.07**	31.3	0.065	0.010	15.0	0.010	0.157	114.4		**85.2**
17:15	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.005	0.075	114.5		**84.7**
17:30	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**84.8**
17:45	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**84.6**
18:00	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**84.1**
18:15	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**85**
18:30	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.1**
18:45	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.4**
19:00	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.3**
19:15	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.3**
19:30	**0**	**1**	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.3**
19:45	**0**	1	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.3**
20:00	**0**	1	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.4**
20:15	**0**	1	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.5**
20:30	**0**	1	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.4**
20:45	**0**	1	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.1**
21:00	**0**	1	0	**26**	**12.07**	31.3	0.065	0.000	15.0	0.000	0.000	114.5		**86.4**
							Avg's:	0.154	720.0			110.9	Avg:	**88.5**

S Kujawa									
8/5/2003				**Test Results**	Str RPM:	**456**	Start		
TEST RUN	**F-10**								
	Results								
	Product slurry Sp. Gr.:	1.04							
	Final Product Slurry, ml:	**505**							
	Final Product Slurry, gm:	**525.9**							
	Dewar Flask net wt., gm	**0.6207**							
	Liquid/slurry Product, gm:	526.5		(Slurry Wt, 100% H2O2/O2 RXN):	534				
	Product Gas Weight, gm:	114.5		**Gas Results are "Somewhat" dummy numbers pending analyses**					
	Product Wt, gm:	641.0							
	Total Charge Weight, gm:	**647**							
	Overall Mass Balance								
	Mass Balance Closure:	99.0%							
	Mass balance w/o gas:	81%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene		Anal. code			
	Slurry analysis, 1, mg/kg:	1.950	U	Slurry analysis, 1, mg/kg:	4.990	U-RE			
	Slurry analysis, 2, mg/kg:	1.960	U	Slurry analysis, 2, mg/kg:	0.868	J-RE			
	Avg., mg/kg	1.955		Avg., mg/kg	2.929				
	Total, mg:	1.028		Total, mg:	1.540				
	TCE, DRE, %	99.88%		HCB, DRE, %	74.33%				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	1.950	U	Slurry analysis, 1, mg/kg:	4.990	U-RE			
	Slurry analysis, 2, mg/kg:	1.960	U	Slurry analysis, 2, mg/kg:	4.730	U-RE			
	Avg., mg/kg	1.955		Avg., mg/kg	4.860				
	Total, mg:	1.028		Total, mg:	2.556				
	PCE, DRE, %	98.62%		BP, DRE, %	14.80%		Run time:	12	Hours
							Run Temp:	88.5	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	400	ml
	Slurry analysis, 1, mg/kg:	1.950	U	Slurry analysis, 1, mg/kg:	0.000				
	Slurry analysis, 2, mg/kg:	1.960	U	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	1.955		Avg., mg/kg	0.000				
	Total, mg:	1.028		Total, mg:	0.000				
	TCA, DRE, %	98.93%		Aroclor, DRE, %	#VALUE!				
	BEHP								
	Slurry analysis, 1, mg/kg:	28.500	RE						
	Slurry analysis, 2, mg/kg:	56.500	RE						
	Avg., mg/kg	42.500							
	Total, mg:	22.351							
	BEHP, DRE, %	87.09%							

	8/8/2003:
	All heat transfer calculations are to be considered incorrect due to uncertainty of the condenser water flow rates during the runs through run F-6.

S Kujawa				**Heat Balance**					
9/16/2003									
TEST RUN	**F-10**								
						numbers in red are questionable.			
	Condenser Bath			Oil Bath					
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**				
Time				Boss DS oil density, gm/ml	0.873				
				Boss DS oil heat cap. cal/gm/deg C	0.4				
9:39	Water Return Temp, Deg C	**7.6**		Oil Return Temp, Deg C	**78.8**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**16.72**		Bucket ck time, sec	**10.13**				
	Flow rate, ml/min	359		Flow rate, ml/min	592				
	Enthalpy change, calorie/min:	933		Enthalpy change, calorie/min:	-4385				
	Flask Top Surface Temp., C	**74.1**		Flask bottom Surface Temp., C	**76.2**				
	Flask Top Surface Temp., F	165		Flask bottom Surface Temp., F	169				
	Air Temp. ,F	**73.4**		Air Temp. ,F	**73.4**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1387		Convective Loss, cal/min	2035				
	Radiative Loss, cal/min	636		Radiative Loss, cal/min	943				
	Flask top Heat Loss, cal/min	2023		Flask bottom Heat Loss, cal/min	2978	5001			
	Reactor Temperature, C	**92.3**		P1 Gas Temp. Deg C.	**23**				
	Peroxide Temperature, F	73.4		Gas Flow Rate, gm/min	0.454		Correlated losses, cal/min	4708	
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0134		Reflux Gas Delta H, cal/min	780	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	7.44		Revised Acc/generation, cal/min	-1236	
	Peroxide Enthalpy Change, cal/r	133.1							
				Accumulation/Generation, cal/min	-1690				
10:32	Water Return Temp, Deg C	**8.2**		Oil Return Temp, Deg C	**77.6**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**17.09**		Bucket ck time, sec	**10.15**				
	Flow rate, ml/min	351		Flow rate, ml/min	591				
	Enthalpy change, calorie/min:	1123		Enthalpy change, calorie/min:	-4624				
	Flask Top Surface Temp., C	**74.4**		Flask bottom Surface Temp., C	**76.2**				
	Flask Top Surface Temp., F	166		Flask bottom Surface Temp., F	169				
	Air Temp. ,F	**77**		Air Temp. ,F	**77**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1341		Convective Loss, cal/min	1959				
	Radiative Loss, cal/min	621		Radiative Loss, cal/min	915				
	Flask top Heat Loss, cal/min	1962		Flask bottom Heat Loss, cal/min	2874	4836			
	Reactor Temperature, C	**91.6**		P1 Gas Temp. Deg C.	**23**				
	Peroxide Temperature, F	77		Gas Flow Rate, gm/min	0.358		Correlated losses, cal/min	4708	
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0106		Reflux Gas Delta H, cal/min	615	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	5.87		Revised Acc/generation, cal/min	-827	
	Peroxide Enthalpy Change, cal/r	127.9							
				Accumulation/Generation, cal/min	-1469				

11:41	Water Return Temp, Deg C	**8.2**		Oil Return Temp, Deg C	**77.5**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**17.09**		Bucket ck time, sec	**9.53**				
	Flow rate, ml/min	351		Flow rate, ml/min	630				
	Enthalpy change, calorie/min:	1123		Enthalpy change, calorie/min:	-4947				
	Flask Top Surface Temp., C	**75.5**		Flask bottom Surface Temp., C	**76.9**				
	Flask Top Surface Temp., F	168		Flask bottom Surface Temp., F	170				
	Air Temp. ,F	**79**		Air Temp. ,F	**79**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1341		Convective Loss, cal/min	1943				
	Radiative Loss, cal/min	627		Radiative Loss, cal/min	915				
	Flask top Heat Loss, cal/min	1968		Flask bottom Heat Loss, cal/min	2859	4826			
	Reactor Temperature, C	**93**		P1 Gas Temp. Deg C.	**26**				
	Peroxide Temperature, F	79		Gas Flow Rate, gm/min	0.441		Correlated losses, cal/min	4508	
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0960		Reflux Gas Delta H, cal/min	758	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	53.28		Revised Acc/generation, cal/min	-447	
	Peroxide Enthalpy Change, cal/r	128.2							
				Accumulation/Generation, cal/min	-1185				

S Kujawa	F-10								
9/16/2003									
12:41	Water Return Temp, Deg C	**8.1**		Oil Return Temp, Deg C	**77.3**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**16.91**		Bucket ck time, sec	**10.06**				
	Flow rate, ml/min	355		Flow rate, ml/min	596				
	Enthalpy change, calorie/min:	1100		Enthalpy change, calorie/min:	-4728				
	Flask Top Surface Temp., C	**75.7**		Flask bottom Surface Temp., C	**76**				
	Flask Top Surface Temp., F	168		Flask bottom Surface Temp., F	169				
	Air Temp. ,F	**83**		Air Temp. ,F	**83**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1286		Convective Loss, cal/min	1824				
	Radiative Loss, cal/min	608		Radiative Loss, cal/min	864				
	Flask top Heat Loss, cal/min	1894		Flask bottom Heat Loss, cal/min	2687	4581			
	Reactor Temperature, C	**93.8**		P1 Gas Temp. Deg C.	**27.5**				
	Peroxide Temperature, F	83		Gas Flow Rate, gm/min	0.398		Correlated losses, cal/min	4409	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0176		Reflux Gas Delta H, cal/min	683	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	9.79		Revised Acc/generation, cal/min	-364	
	Peroxide Enthalpy Change, cal/r	0.0							
				Accumulation/Generation, cal/min	-963				
13:52	Water Return Temp, Deg C	**8.9**		Oil Return Temp, Deg C	**79.1**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**16.32**		Bucket ck time, sec	**10.12**				
	Flow rate, ml/min	368		Flow rate, ml/min	593				
	Enthalpy change, calorie/min:	1434		Enthalpy change, calorie/min:	-4327				
	Flask Top Surface Temp., C	**75.6**		Flask bottom Surface Temp., C	**77.3**				
	Flask Top Surface Temp., F	168		Flask bottom Surface Temp., F	171				
	Air Temp. ,F	**85**		Air Temp. ,F	**85**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1253		Convective Loss, cal/min	1831				
	Radiative Loss, cal/min	595		Radiative Loss, cal/min	877				
	Flask top Heat Loss, cal/min	1848		Flask bottom Heat Loss, cal/min	2708	4556			
	Reactor Temperature, C	**91.3**		P1 Gas Temp. Deg C.	**29.5**				
	Peroxide Temperature, F	85		Gas Flow Rate, gm/min	0.173		Correlated losses, cal/min	4276	
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0051		Reflux Gas Delta H, cal/min	297	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	2.83		Revised Acc/generation, cal/min	-246	
	Peroxide Enthalpy Change, cal/r	0.0							
				Accumulation/Generation, cal/min	-1665				

15:33	Water Return Temp, Deg C	**8.7**		Oil Return Temp, Deg C	**78.8**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	**16.46**		Bucket ck time, sec	**10.74**				
	Flow rate, ml/min	365		Flow rate, ml/min	559				
	Enthalpy change, calorie/min:	1349		Enthalpy change, calorie/min:	-4136				
	Flask Top Surface Temp., C	**71.5**		Flask bottom Surface Temp., C	**76**				
	Flask Top Surface Temp., F	161		Flask bottom Surface Temp., F	169				
	Air Temp. ,F	**89**		Air Temp. ,F	**89**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1081		Convective Loss, cal/min	1696				
	Radiative Loss, cal/min	508		Radiative Loss, cal/min	815				
	Flask top Heat Loss, cal/min	1590		Flask bottom Heat Loss, cal/min	2511	4101			
	Reactor Temperature, C	**86.7**		P1 Gas Temp. Deg C.	**30.5**				
	Peroxide Temperature, F	89		Gas Flow Rate, gm/min	0.040		Correlated losses, cal/min	4209	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0012		Reflux Gas Delta H, cal/min	69	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.66		Revised Acc/generation, cal/min	-142	
	Peroxide Enthalpy Change, cal/r	0.0							
				Accumulation/Generation, cal/min	-1314				
16:42	Water Return Temp, Deg C	**8.2**		Oil Return Temp, Deg C	**76.3**				
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**				
	Bucket ck time, sec	16.46		Bucket ck time, sec	10.74		Times from 15:33 data		
	Flow rate, ml/min	365		Flow rate, ml/min	559				
	Enthalpy change, calorie/min:	1166		Enthalpy change, calorie/min:	-4623				
	Flask Top Surface Temp., C	**69.8**		Flask bottom Surface Temp., C	**74.8**				
	Flask Top Surface Temp., F	158		Flask bottom Surface Temp., F	167				
	Air Temp. ,F	**85**		Air Temp. ,F	**85**				
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75				
	Top flask Area, in^2	188		bottom flask Area, in^2	265				
	emisivity	0.94		emisivity	0.94				
	Convective Loss, cal/min	1095		Convective Loss, cal/min	1735				
	Radiative Loss, cal/min	506		Radiative Loss, cal/min	821				
	Flask top Heat Loss, cal/min	1601		Flask bottom Heat Loss, cal/min	2556	4158			
	Reactor Temperature, C	**85.1**		P1 Gas Temp. Deg C.	**27**				
	Peroxide Temperature, F	85		Gas Flow Rate, gm/min	0.013		Correlated losses, cal/min	4442	
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0004		Reflux Gas Delta H, cal/min	23	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.22		Revised Acc/generation, cal/min	159	
	Peroxide Enthalpy Change, cal/r	0.0							
				Accumulation/Generation, cal/min	-701				

	S Kujawa												
	7/28/2003						Reactor Charge						
	TEST RUN	**F-12**											
				SURROGATE			**Target**				**Actual**		
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
		Charge:				150							
	water					120.0442	120.04			**120.636**			
	hydraulic oil					2.0938	2.38			**2.134**			
	cutting oil					2.0938	2.38			**2.156**			
	IsoOctane									**none**			
	Al2O3					0.3349	0.08	83.9		**0.334**			
	CaO					0.5413	0.16	163.0		**0.542**			
	Cr2O3					0.2326	0.04	44.6		**0.232**			
	Fe2O3					1.3032	0.44	435.1		**1.303**			
	MgO					0.7269	0.38	375.9		**0.726**			
	MnO					0.4254	0.08	82.1		**0.425**			
	SiO2					8.3907	3.71	3712.7		**8.389**			
	Na3PO4					12.2584	4.83	4831.8		**12.259**			
	KOH					0.3224	0.16	157.8		**0.323**			
	Hg					0.0516	0.00	3.8		**0.069**		4	
	Aroclor-1260		Number of Vials:							**none**			
	TCE					0.8431	0.58	577.5		**0.8557**		580	
	PCE					0.0747	0.05	45.8		**0.0704**		46	
	TCA					0.0941	0.07	70.2		**0.0932**		70	
	BEHP					0.1619	0.17	165.2		**0.1580**		170	
		Total:				150.0	135.55			150.7			
				REAGENTS									
	Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
	HCB					0.0056				**0.0062**			
	BP					0.0029				**0.0032**			
	FeSO4 7H2O					1.5				**1.4993**			
	H2O2 (50%)					600	500			600	**500**		
	H2SO4 (con)									**11.598**			
	NaOH (4 M)									**0.917**			
		Total:				751.5				765			

S Kujawa
7/29/2003

Gas Phase Data/Calculations

TEST RUN **F-12**

Results **Gas Phase Calculations**

Run Time	Gas Vol, cc	Time, sec	accm	Temp, F	P baro	MW	Density	gm/min	Time delta	Rate avg	Mass delta	Mass sum		Rctr T
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
9:45	0	1	0	**75**	**12.18**	31.3	0.066	0.000		0.000	0.000	0.0		
9:50	**50**	**23.69**	127	**75**	**12.18**	31.3	0.066	0.135	5.0	0.067	0.337	0.3		81
10:00	**50**	**12.81**	234	**75**	**12.18**	31.3	0.066	0.249	10.0	0.192	1.921	2.3		85.3
10:15	50	11.19	268	76	**12.18**	31.3	0.066	0.285	15.0	0.267	4.007	6.3		87
10:30	50	9.71	309	78	**12.18**	31.3	0.066	0.327	15.0	0.306	4.591	10.9		87.9
10:45	50	8.78	342	83	**12.18**	31.3	0.065	0.358	15.0	0.343	5.142	16.0		88.1
11:00	50	8.53	352	85	**12.18**	31.3	0.065	0.368	15.0	0.363	5.446	21.4		88.7
11:15	50	7.91	379	80	**12.18**	31.3	0.066	0.400	15.0	0.384	5.758	27.2		88.8
11:30	50	7.62	394	79	**12.18**	31.3	0.066	0.416	15.0	0.408	6.121	33.3		89
11:45	50	7.15	420	81	**12.18**	31.3	0.066	0.442	15.0	0.429	6.434	39.8		89.9
12:00	50	7.97	376	82	**12.18**	31.3	0.066	0.396	15.0	0.419	6.281	46.0		89.7
12:15	50	8.13	369	81	**12.18**	31.3	0.066	0.389	15.0	0.392	5.881	51.9		88.6
12:30	50	7.65	392	81	**12.18**	31.3	0.066	0.413	15.0	0.401	6.011	57.9		88.8
12:45	50	7.37	407	82	**12.18**	31.3	0.066	0.428	15.0	0.420	6.306	64.2		89.1
13:00	50	7.47	402	83	**12.18**	31.3	0.065	0.421	15.0	0.425	6.369	70.6		89.2
13:15	50	6.97	430	82	**12.18**	31.3	0.066	0.452	15.0	0.437	6.553	77.2		89.2
13:30	50	6.84	439	83	**12.18**	31.3	0.065	0.460	15.0	0.456	6.844	84.0		89.3
13:45	50	7	429	83	**12.18**	31.3	0.065	0.450	15.0	0.455	6.823	90.8		89.2
14:00	50	6.72	446	82	**12.18**	31.3	0.066	0.469	15.0	0.459	6.891	97.7		89.1
14:15	50	6.91	434	83	**12.18**	31.3	0.065	0.455	15.0	0.462	6.935	104.7		89.6
14:30	50	8.06	372	83	**12.18**	31.3	0.065	0.390	15.0	0.423	6.345	111.0		89.3
14:45	50	9.44	318	83	**12.18**	31.3	0.065	0.333	15.0	0.362	5.429	116.4		88.8
15:00	50	10.75	279	82	**12.18**	31.3	0.066	0.293	15.0	0.313	4.700	121.1		88.3
15:15	50	13.85	217	82	**12.18**	31.3	0.066	0.228	15.0	0.260	3.907	125.0		88.2
15:30	50	14.5	207	84	**12.18**	31.3	0.065	0.217	15.0	0.222	3.332	128.4		87.4
15:45	50	21.62	139	83	**12.18**	31.3	0.065	0.146	15.0	0.181	2.717	131.1		87.5
16:00	50	26.81	112	85	**12.18**	31.3	0.065	0.117	15.0	0.131	1.969	133.1		87.1
16:15	50	35.56	84	86	**12.18**	31.3	0.065	0.088	15.0	0.102	1.537	134.6		86.8
16:30	10	10.58	57	86	**12.18**	31.3	0.065	0.059	15.0	0.074	1.104	135.7		86.3
16:45	10	15.94	38	86	**12.18**	31.3	0.065	0.039	15.0	0.049	0.738	136.4		84.5
17:00	10	18.5	32	86	**12.18**	31.3	0.065	0.034	15.0	0.037	0.548	137.0		84.4
17:15	10	20.25	30	86	**12.18**	31.3	0.065	0.031	15.0	0.032	0.486	137.5		84.6
17:30	10	13.33	45	86	**12.18**	31.3	0.065	0.047	15.0	0.039	0.584	138.0		84.2
17:45	10	15.34	39	87	**12.18**	31.3	0.065	0.041	15.0	0.044	0.658	138.7		84.3
18:00	10	20.59	29	87	**12.18**	31.3	0.065	0.030	15.0	0.036	0.533	139.2		84.1
18:15	10	27.78	22	87	**12.18**	31.3	0.065	0.022	15.0	0.026	0.396	139.6		83.6
18:30	10	32.72	18	87	**12.18**	31.3	0.065	0.019	15.0	0.021	0.312	139.9		83.4
18:45	10	40.18	15	87	**12.18**	31.3	0.065	0.016	15.0	0.017	0.260	140.2		83.4
19:00	10	48.12	12	86	**12.18**	31.3	0.065	0.013	15.0	0.014	0.214	140.4		83.6
19:15	10	62.5	10	86	**12.18**	31.3	0.065	0.010	15.0	0.012	0.173	140.6		83.4
19:30	5	46.78	6	86	**12.18**	31.3	0.065	0.007	15.0	0.008	0.125	140.7		83.4
19:45	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.003	0.050	140.8		83.3
20:00	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		83.2
20:15	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		83
20:30	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		83
20:45	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		82.9
21:00	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		82.8
21:15	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		82.7
21:30	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		82.6
21:45	0	1	0	86	**12.18**	31.3	0.065	0.000	15.0	0.000	0.000	140.8		83.1
							Avg's:	0.186	720.0			134.0	Avg:	86.1

S Kujawa									
7/28/2003				**Test Results**	Str RPM:	**420**	Start		
TEST RUN	**F-12**								
	Results								
	Product slurry Sp. Gr.:	1.03							
	Final Product Slurry, ml:	**587**							
	Final Product Slurry, gm:	**605.1**							
	Dewar Flask net wt., gm	**0.8715**							
	Liquid/slurry Product, gm:	606.0		(Slurry Wt, 100% H2O2/O2 RXN):	624				
	Product Gas Weight, gm:	140.8		**Gas Results are "Somewhat" dummy numbers pending analyses**					
	Product Wt, gm:	746.7							
	Total Charge Weight, gm:	**765**							
	Overall Mass Balance								
	Mass Balance Closure:	97.6%							
	Mass balance w/o gas:	79%							
	Species Mass Results			**Species Mass Results**	**NOTE**				
	TriChloroEthylene		Anal. code	HexachloroBenzene	**NOTE**	Anal. code			
	Slurry analysis, 1, mg/kg:	1.910	U	Slurry analysis, 1, mg/kg:	0.975	J			
	Slurry analysis, 2, mg/kg:	1.950	U	Slurry analysis, 2, mg/kg:	0.778	J			
	Avg., mg/kg	1.930		Avg., mg/kg	0.877				
	Total, mg:	1.168		Total, mg:	0.530				
	TCE, DRE, %	99.86%		HCB, DRE, %	91.45%				
	TetraChloroEthylene			Bi-Phenyl	**NOTE**				
	Slurry analysis, 1, mg/kg:	1.910	U	Slurry analysis, 1, mg/kg:	4.640	U			
	Slurry analysis, 2, mg/kg:	1.950	U	Slurry analysis, 2, mg/kg:	4.280	U			
	Avg., mg/kg	1.930		Avg., mg/kg	4.460				
	Total, mg:	1.168		Total, mg:	2.699				
	PCE, DRE, %	98.34%		BP, DRE, %	15.66%		Run time:	12	Hours
							Run Temp:	86.1	deg C
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	500	ml
	Slurry analysis, 1, mg/kg:	1.910	U	Slurry analysis, 1, mg/kg:	0.000				
	Slurry analysis, 2, mg/kg:	1.950	U	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	1.930		Avg., mg/kg	0.000				
	Total, mg:	1.168		Total, mg:	0.000				
	TCA, DRE, %	98.75%		Aroclor, DRE, %	#VALUE!				
	BEHP	**NOTE**							
	Slurry analysis, 1, mg/kg:	52.400							
	Slurry analysis, 2, mg/kg:	40.400							
	Avg., mg/kg	46.400							
	Total, mg:	28.077							
	BEHP, DRE, %	82.23%							

	8/8/2003:								
	All heat transfer calculations are to be considered incorrect due to uncertainty of the condenser water flow rates during the runs through run F-6.								

S Kujawa				**Heat Balance**				
7/29/2003					numbers in red are questionable.			
TEST RUN	**F-12**							
	Condenser Bath			Oil Bath				
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**			
Time				Boss DS oil density, gm/ml	0.873			
				Boss DS oil heat cap. cal/gm/deg C	0.4			
9:55	Water Return Temp, Deg C	**8.1**		Oil Return Temp, Deg C	**75.9**			
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**			
	Bucket ck time, sec	**17.44**		Bucket ck time, sec	**9.41**			
	Flow rate, ml/min	344		Flow rate, ml/min	638			
	Enthalpy change, calorie/min:	1067		Enthalpy change, calorie/min:	-5366			
	Flask Top Surface Temp., C	**75.5**		Flask bottom Surface Temp., C	**75.6**			
	Flask Top Surface Temp., F	168		Flask bottom Surface Temp., F	168			
	Air Temp. ,F	75		Air Temp. ,F	75			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1528		Convective Loss, cal/min	2158			
	Radiative Loss, cal/min	649		Radiative Loss, cal/min	917			
	Flask top Heat Loss, cal/min	2177		Flask bottom Heat Loss, cal/min	3075	5253		
	Reactor Temperature, C	**85.3**		P1 Gas Temp. Deg C.	**26**			
	Peroxide Temperature, F	75		Gas Flow Rate, gm/min	0.192		Correlated losses, cal/min	4508
	Peroxide Flow Rate, ml/min	5		Water Vap. gm/min	0.0057		Reflux Gas Delta H, cal/min	330
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	3.15		Revised Acc/generation, cal/min	233
	Peroxide Enthalpy Change, cal/min	294.8						
				Accumulation/Generation, cal/min	-1251			
11:02	Water Return Temp, Deg C	**8.3**		Oil Return Temp, Deg C	**79.3**			
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**			
	Bucket ck time, sec	**17.33**		Bucket ck time, sec	**9.75**			
	Flow rate, ml/min	346		Flow rate, ml/min	615			
	Enthalpy change, calorie/min:	1143		Enthalpy change, calorie/min:	-4448			
	Flask Top Surface Temp., C	**77.7**		Flask bottom Surface Temp., C	**77.8**			
	Flask Top Surface Temp., F	172		Flask bottom Surface Temp., F	172			
	Air Temp. ,F	85		Air Temp. ,F	85			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1429		Convective Loss, cal/min	2018			
	Radiative Loss, cal/min	628		Radiative Loss, cal/min	888			
	Flask top Heat Loss, cal/min	2057		Flask bottom Heat Loss, cal/min	2906	4964		
	Reactor Temperature, C	**88.7**		P1 Gas Temp. Deg C.	**27**			
	Peroxide Temperature, F	85		Gas Flow Rate, gm/min	0.363		Correlated losses, cal/min	4442
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0107		Reflux Gas Delta H, cal/min	623
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	5.95		Revised Acc/generation, cal/min	-731
	Peroxide Enthalpy Change, cal/min	113.8						
				Accumulation/Generation, cal/min	-1778			

12:18	Water Return Temp, Deg C	**8.4**		Oil Return Temp, Deg C	**80.2**			
	bucket ck volume, ml	**100**		bucket ck volume, ml	**100**			
	Bucket ck time, sec	**17.06**		Bucket ck time, sec	**9.69**			
	Flow rate, ml/min	352		Flow rate, ml/min	619			
	Enthalpy change, calorie/min:	1196		Enthalpy change, calorie/min:	-4281			
	Flask Top Surface Temp., C	**77.8**		Flask bottom Surface Temp., C	**78.2**			
	Flask Top Surface Temp., F	172		Flask bottom Surface Temp., F	173			
	Air Temp. ,F	81		Air Temp. ,F	81			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1498		Convective Loss, cal/min	2128			
	Radiative Loss, cal/min	653		Radiative Loss, cal/min	929			
	Flask top Heat Loss, cal/min	2150		Flask bottom Heat Loss, cal/min	3057	5207		
	Reactor Temperature, C	**88.6**		P1 Gas Temp. Deg C.	**28**			
	Peroxide Temperature, F	81		Gas Flow Rate, gm/min	0.392		Correlated losses, cal/min	4375
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0116		Reflux Gas Delta H, cal/min	673
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	6.42		Revised Acc/generation, cal/min	-885
	Peroxide Enthalpy Change, cal/min	117.8						
				Accumulation/Generation, cal/min	-2246			

S Kujawa	F-12	7/29/2003						
13:16	Water Return Temp, Deg C	8.2		Oil Return Temp, Deg C	79.7			
	bucket ck volume, ml	100		bucket ck volume, ml	100			
	Bucket ck time, sec	16.78		Bucket ck time, sec	9.56			
	Flow rate, ml/min	358		Flow rate, ml/min	628			
	Enthalpy change, calorie/min:	1144		Enthalpy change, calorie/min:	-4449			
	Flask Top Surface Temp., C	79.9		Flask bottom Surface Temp., C	77			
	Flask Top Surface Temp., F	176		Flask bottom Surface Temp., F	171			
	Air Temp. ,F	82		Air Temp. ,F	82			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1543		Convective Loss, cal/min	2054			
	Radiative Loss, cal/min	681		Radiative Loss, cal/min	894			
	Flask top Heat Loss, cal/min	2224		Flask bottom Heat Loss, cal/min	2948	5173		
	Reactor Temperature, C	89.2		P1 Gas Temp. Deg C.	29			
	Peroxide Temperature, F	82		Gas Flow Rate, gm/min	0.437		Correlated losses, cal/min	4309
	Peroxide Flow Rate, ml/min	2		Water Vap. gm/min	0.0129		Reflux Gas Delta H, cal/min	750
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	7.16		Revised Acc/generation, cal/min	-728
	Peroxide Enthalpy Change, cal/min	117.9						
				Accumulation/Generation, cal/min	-1993			
14:17	Water Return Temp, Deg C	8.5		Oil Return Temp, Deg C	79.4			
	bucket ck volume, ml	100		bucket ck volume, ml	100			
	Bucket ck time, sec	18.6		Bucket ck time, sec	9.65			
	Flow rate, ml/min	323		Flow rate, ml/min	622			
	Enthalpy change, calorie/min:	1129		Enthalpy change, calorie/min:	-4473			
	Flask Top Surface Temp., C	74.8		Flask bottom Surface Temp., C	75.8			
	Flask Top Surface Temp., F	167		Flask bottom Surface Temp., F	168			
	Air Temp. ,F	83		Air Temp. ,F	83			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1376		Convective Loss, cal/min	1981			
	Radiative Loss, cal/min	594		Radiative Loss, cal/min	859			
	Flask top Heat Loss, cal/min	1970		Flask bottom Heat Loss, cal/min	2840	4810		
	Reactor Temperature, C	89.6		P1 Gas Temp. Deg C.	29			
	Peroxide Temperature, F	83		Gas Flow Rate, gm/min	0.008		Correlated losses, cal/min	4309
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0002		Reflux Gas Delta H, cal/min	14
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.14		Revised Acc/generation, cal/min	149
	Peroxide Enthalpy Change, cal/min	0.0						
				Accumulation/Generation, cal/min	-1467			

15:40	Water Return Temp, Deg C	9.2		Oil Return Temp, Deg C	79.3			
	bucket ck volume, ml	100		bucket ck volume, ml	100			
	Bucket ck time, sec	16.43		Bucket ck time, sec	9.65			
	Flow rate, ml/min	365		Flow rate, ml/min	622			
	Enthalpy change, calorie/min:	1534		Enthalpy change, calorie/min:	-4494			
	Flask Top Surface Temp., C	76.6		Flask bottom Surface Temp., C	78.4			
	Flask Top Surface Temp., F	170		Flask bottom Surface Temp., F	173			
	Air Temp. ,F	83		Air Temp. ,F	83			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1429		Convective Loss, cal/min	2090			
	Radiative Loss, cal/min	622		Radiative Loss, cal/min	918			
	Flask top Heat Loss, cal/min	2051		Flask bottom Heat Loss, cal/min	3007	5059		
	Reactor Temperature, C	87.5		P1 Gas Temp. Deg C.	30			
	Peroxide Temperature, F	83		Gas Flow Rate, gm/min	0.181		Correlated losses, cal/min	4242
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0053		Reflux Gas Delta H, cal/min	311
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	2.97		Revised Acc/generation, cal/min	-59
	Peroxide Enthalpy Change, cal/min	0.0						
				Accumulation/Generation, cal/min	-2101			
19:10	Water Return Temp, Deg C	8.5		Oil Return Temp, Deg C	78.6			
	bucket ck volume, ml	100		bucket ck volume, ml	100			
	Bucket ck time, sec	18.47		Bucket ck time, sec	9.72			
	Flow rate, ml/min	325		Flow rate, ml/min	617			
	Enthalpy change, calorie/min:	1137		Enthalpy change, calorie/min:	-4613			
	Flask Top Surface Temp., C	69.6		Flask bottom Surface Temp., C	75.5			
	Flask Top Surface Temp., F	157		Flask bottom Surface Temp., F	168			
	Air Temp. ,F	86		Air Temp. ,F	86			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1173		Convective Loss, cal/min	1899			
	Radiative Loss, cal/min	497		Radiative Loss, cal/min	828			
	Flask top Heat Loss, cal/min	1670		Flask bottom Heat Loss, cal/min	2728	4397		
	Reactor Temperature, C	83.4		P1 Gas Temp. Deg C.	30.5			
	Peroxide Temperature, F	86		Gas Flow Rate, gm/min	0.012		Correlated losses, cal/min	4209
	Peroxide Flow Rate, ml/min	0		Water Vap. gm/min	0.0003		Reflux Gas Delta H, cal/min	20
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.19		Revised Acc/generation, cal/min	384
	Peroxide Enthalpy Change, cal/min	0.0						
				Accumulation/Generation, cal/min	-922			

S Kujawa												
8/18/2003						**Reactor Charge**						
TEST RUN	**F-16**											
			SURROGATE			**Target**				**Actual**		
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
	Charge:				150							
water					120.0442	120.04			**120.537**			
hydraulic oil					2.0938	2.38			**2.067**			
cutting oil					2.0938	2.38			**2.088**			
Al2O3					0.3349	0.08	83.9		**0.3351**			
CaO					0.5413	0.16	163.0		**0.5407**			
Cr2O3					0.2326	0.04	44.6		**0.2331**			
Fe2O3					1.3032	0.44	435.1		**1.3036**			
MgO					0.7269	0.38	375.9		**0.7270**			
MnO					0.4254	0.08	82.1		**0.4255**			
SiO2					8.3907	3.71	3712.7		**8.3912**			
Na3PO4					12.2584	4.83	4831.8		**12.2585**			
KOH					0.3224	0.16	157.8		**0.3220**			
Hg					0.0516	0.00	3.8		**0.0729**		4	
Aroclor-1260					0.0070	0.0045	4.5		**0.0135**			
TCE					0.8431	0.58	577.5		**0.8516**		580	
PCE					0.0747	0.05	45.8		**0.0750**		46	
TCA					0.0941	0.07	70.2		**0.0809**		70	
BEHP					0.1619	0.17	165.2		**0.1656**		170	
	Total:				150.0	135.56			150.5			
			REAGENTS									
Component					**Grams**	**Milliliters**	**Micro L**		**Grams**	**Milliliters**	**Micro L**	
HCB									**0.0060**			
BP									**0.0030**			
FeSO4 7H2O					1.5				**1.5002**			
H2O2 (50%)					600	500			600	**500**		
H2SO4 (con)									**15.7009**			
NaOH (4 M)									**8.582**			
	Total:				751.5				776.3			

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	8/18/2003													
	TEST RUN	**F-16**												
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, C**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
7:30	**50**	**9.5**	316	**20**	**12.08**	31.3	0.067	0.338	0.0	0.169	0.00	0.0		**90.4**
7:35	**50**	**10.28**	292	**20**	**12.08**	31.3	0.067	0.313	5.0	0.325	1.63	1.6		**89.6**
7:45	**50**	**7.09**	423	**20**	**12.08**	31.3	0.067	0.453	10.0	0.383	3.83	5.5		**91.6**
8:00	**50**	**6.97**	430	**19.5**	**12.08**	31.3	0.067	0.462	15.0	0.458	6.86	12.3		**92.4**
8:15	**50**	**7.12**	421	**19.5**	**12.08**	31.3	0.067	0.452	15.0	0.457	6.86	19.2		**92.3**
8:30	**50**	**7.35**	408	**19**	**12.08**	31.3	0.067	0.439	15.0	0.445	6.68	25.9		**91.9**
8:45	**50**	**8.78**	342	**18.5**	**12.08**	31.3	0.067	0.368	15.0	0.403	6.05	31.9		**91.7**
9:00	**50**	**7.75**	387	**18.5**	**12.08**	31.3	0.067	0.417	15.0	0.392	5.89	37.8		**91.6**
9:15	**50**	**7.88**	381	**18**	**12.08**	31.3	0.067	0.411	15.0	0.414	6.21	44.0		**91.7**
9:30	**50**	**7.56**	397	**19**	**12.08**	31.3	0.067	0.427	15.0	0.419	6.28	50.3		**92**
9:45	**50**	**7.78**	386	**19.5**	**12.08**	31.3	0.067	0.414	15.0	0.420	6.30	56.6		**91.9**
10:00	**50**	**7.88**	381	**20**	**12.08**	31.3	0.067	0.408	15.0	0.417	6.26	62.8		**92.4**
10:15	**50**	**7.69**	390	**20**	**12.08**	31.3	0.067	0.418	15.0	0.413	6.19	69.0		**92.7**
10:30	**50**	**7.54**	398	**21**	**12.08**	31.3	0.067	0.425	15.0	0.421	6.32	75.4		**92.6**
10:45	**50**	**7.5**	400	**21**	**12.08**	31.3	0.067	0.427	15.0	0.426	6.39	81.7		**92.5**
11:00	**50**	**7.28**	412	**22**	**12.08**	31.3	0.066	0.438	15.0	0.433	6.49	88.2		**92.6**
11:15	**50**	**7.59**	395	**22**	**12.08**	31.3	0.066	0.421	15.0	0.430	6.44	94.7		**92.7**
11:30	**50**	**7.38**	407	**23**	**12.08**	31.3	0.066	0.432	15.0	0.426	6.39	101.1		**92.7**
11:45	**50**	**7.97**	376	**23**	**12.08**	31.3	0.066	0.399	15.0	0.415	6.23	107.3		**93.4**
12:00	**50**	**9.18**	327	**24**	**12.08**	31.3	0.066	0.346	15.0	0.373	5.59	112.9		**93**
12:15	**50**	**10.81**	278	**24**	**12.08**	31.3	0.066	0.293	15.0	0.320	4.79	117.7		**92.6**
12:30	**50**	**13.22**	227	**25**	**12.08**	31.3	0.066	0.239	15.0	0.266	4.00	121.7		**91.9**
12:45	**50**	**15.31**	196	**25**	**12.08**	31.3	0.066	0.206	15.0	0.223	3.34	125.0		**91.5**
13:00	**50**	**18.56**	162	**25**	**12.08**	31.3	0.066	0.170	15.0	0.188	2.82	127.8		**91.1**
13:15	**50**	**22.79**	132	**26**	**12.08**	31.3	0.066	0.138	15.0	0.154	2.32	130.2		**90.7**
13:30	**50**	**26.31**	114	**26**	**12.08**	31.3	0.066	0.120	15.0	0.129	1.94	132.1		**90.3**
13:45	**50**	**31.31**	96	**27**	**12.08**	31.3	0.065	0.100	15.0	0.110	1.65	133.8		**90.1**
14:00	**50**	**35.81**	84	**28**	**12.08**	31.3	0.065	0.088	15.0	0.094	1.41	135.2		**89.9**
14:15	**10**	**21.53**	28	**27**	**12.08**	31.3	0.065	0.029	15.0	0.058	0.87	136.0		**88.3**
14:30	**20**	**20.72**	58	**27**	**12.08**	31.3	0.065	0.061	15.0	0.045	0.67	136.7		**87.4**
14:45	**10**	**17**	35	**27**	**12.08**	31.3	0.065	0.037	15.0	0.049	0.73	137.4		**86.8**
15:00	**10**	**13.59**	44	**27**	**12.08**	31.3	0.065	0.046	15.0	0.042	0.62	138.1		**86.3**
15:15	**10**	**18.34**	33	**28**	**12.08**	31.3	0.065	0.034	15.0	0.040	0.60	138.7		**86.3**
15:30	**10**	**16.91**	35	**28**	**12.08**	31.3	0.065	0.037	15.0	0.036	0.53	139.2		**85.9**
15:45	**10**	**20.66**	29	**28**	**12.08**	31.3	0.065	0.030	15.0	0.034	0.51	139.7		**85.9**
16:00	**10**	**30.91**	19	**28**	**12.08**	31.3	0.065	0.020	15.0	0.025	0.38	140.1		**85.8**
16:15	**10**	**25.19**	24	**28**	**12.08**	31.3	0.065	0.025	15.0	0.023	0.34	140.4		**85.7**
16:30	**10**	**37.35**	16	**28**	**12.08**	31.3	0.065	0.017	15.0	0.021	0.31	140.7		**85.6**
16:45	**10**	**37.25**	16	**28**	**12.08**	31.3	0.065	0.017	15.0	0.017	0.25	141.0		**85.8**
17:00	**10**	**46.38**	13	**28**	**12.08**	31.3	0.065	0.013	15.0	0.015	0.23	141.2		**85.5**
17:15	**10**	**52.41**	11	**28**	**12.08**	31.3	0.065	0.012	15.0	0.013	0.19	141.4		**85.5**
17:30	**6**	**37.5**	10	**28**	**12.08**	31.3	0.065	0.010	15.0	0.011	0.16	141.6		**85.3**
17:45	**10**	**54.75**	11	**28**	**12.08**	31.3	0.065	0.011	15.0	0.011	0.16	141.7		**85.1**
18:00	**10**	**60.28**	10	**28**	**12.08**	31.3	0.065	0.010	15.0	0.011	0.16	141.9		**85.2**
18:15	**5**	**38.78**	8	**28**	**12.08**	31.3	0.065	0.008	15.0	0.009	0.14	142.0		**85.3**
18:30	**10**	**70.81**	8	**28**	**12.08**	31.3	0.065	0.009	15.0	0.008	0.13	142.2		**85.1**
18:45	**5**	**44.5**	7	**28**	**12.08**	31.3	0.065	0.007	15.0	0.008	0.12	142.3		**85**
19:00	**0**	1	0	**29**	**12.08**	31.3	0.065	0.000	15.0	0.004	0.05	142.3		**85.1**
19:15	**0**	1	0	**29**	**12.08**	31.3	0.065	0.000	15.0	0.000	0.00	142.3		**84.9**
19:30	**0**	1	0	**29**	**12.08**	31.3	0.065	0.000	15.0	0.000	0.00	142.3		**84.8**
							Avg's:	0.200	720.0			143.9	Avg:	**89.1**

	S Kujawa											
	8/27/2003											
	TEST RUN	**F-16**										
Run Time	**% O2**	**% CO2**	**% H2O**	**% CO**	**PPMv TCE**	**PPMv PCE**	**PPMv TCA**	**MW**				
7:30	95.7%	0.1353%	4%	0.0039%	0	0	0	31.4				
7:35	95.7%	**0.1353%**	4%	0.0039%	**16**	0	0	31.4				
7:45	95.7%	0.1419%	4%	0.0039%	0	0	0	31.4				
8:00	95.7%	**0.1485%**	4%	0.0039%	0	**9**	0	31.4				
8:15	95.7%	0.1333%	4%	0.0039%	0	0	0	31.4				
8:30	95.7%	**0.1180%**	4%	**0.0039%**	0	0	0	31.4				
8:45	95.7%	0.0915%	4%	0.0039%	0	0	0	31.4				
9:00	95.7%	**0.0650%**	4%	0.0037%	0	0	0	31.4				
9:15	95.7%	0.0745%	4%	0.0035%	0	0	0	31.4				
9:30	95.7%	**0.0839%**	4%	**0.0035%**	0	0	0	31.4				
9:45	95.7%	0.0815%	4%	0.0035%	0	0	0	31.4				
10:00	95.7%	**0.0791%**	4%	0.0042%	0	0	0	31.4				
10:15	95.7%	0.1242%	4%	0.0049%	0	0	0	31.4				
10:30	95.6%	**0.1693%**	4%	**0.0049%**	0	0	0	31.4				
10:45	95.7%	0.1448%	4%	0.0049%	0	0	0	31.4				
11:00	95.7%	**0.1202%**	4%	0.0045%	0	0	0	31.4				
11:15	95.7%	0.0788%	4%	0.0041%	0	0	0	31.4				
11:30	95.8%	**0.0374%**	4%	**0.0041%**	0	0	0	31.4				
11:45	95.7%	0.0890%	4%	0.0041%	0	0	0	31.4				
12:00	95.7%	**0.1405%**	4%	0.0045%	0	0	0	31.4				
12:15	95.7%	0.1474%	4%	0.0048%	0	0	0	31.4				
12:30	95.6%	**0.1542%**	4%	**0.0048%**	0	0	0	31.4				
12:45	95.7%	0.1319%	4%	0.0048%	0	0	0	31.4				
13:00	95.7%	**0.1095%**	4%	0.0059%	0	0	0	31.4				
13:15	95.7%	0.1267%	4%	0.0070%	0	0	0	31.4				
13:30	95.7%	**0.1438%**	4%	**0.0070%**	0	0	0	31.4				
13:45	95.6%	0.1685%	4%	0.0070%	0	0	0	31.4				
14:00	95.6%	**0.1932%**	4%	0.0046%	0	0	0	31.4				
14:15	95.6%	0.1891%	4%	0.0022%	0	0	0	31.4				
14:30	95.6%	**0.1849%**	4%	**0.0022%**	0	0	0	31.4				
14:45	95.6%	0.2115%	4%	0.0022%	0	0	0	31.4				
15:00	95.6%	**0.2381%**	4%	0.0059%	0	0	0	31.4				
15:15	95.6%	0.1938%	4%	0.0095%	0	0	0	31.4				
15:30	95.6%	**0.1494%**	4%	**0.0095%**	0	0	0	31.4				
15:45	95.6%	0.1661%	4%	0.0095%	0	0	0	31.4				
16:00	95.6%	**0.1827%**	4%	0.0124%	0	0	0	31.4				
16:15	95.6%	0.1687%	4%	0.0153%	0	0	0	31.4				
16:30	95.6%	**0.1546%**	4%	**0.0153%**	0	0	0	31.4				
16:45	95.6%	0.2025%	4%	0.0153%	0	0	0	31.4				
17:00	95.5%	**0.2503%**	4%	0.0153%	0	0	0	31.4				
17:15	95.6%	0.2022%	4%	0.0153%	0	0	0	31.4				
17:30	95.6%	**0.1541%**	4%	**0.0153%**	0	0	0	31.4				
17:45	95.6%	0.1694%	4%	0.0153%	0	0	0	31.4				
18:00	95.6%	**0.1846%**	4%	0.0153%	0	0	0	31.4				
18:15	95.6%	0.1771%	4%	0.0153%	0	0	0	31.4				
18:30	95.6%	**0.1696%**	4%	0.0153%	0	0	0	31.4				
18:45	95.6%	0.1621%	4%	0.0153%	0	0	0	31.4				
19:00	95.6%	**0.1545%**	4%	0.0153%	0	0	0	31.4				
19:15	95.6%	0.1552%	4%	0.0153%	0	0	0	31.4				
19:30	95.6%	**0.1558%**	4%	0.0153%	0	0	0	31.4				

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	8/27/2003													
	TEST RUN	**F-16**												
	Instantaneous rates:							**Integrated quantities:**						
	O2, gm/min	CO2, g/m	H2O g/m	CO g/m	TCE g/m	PCE g/m	TCA g/m	O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
Run Time														
7:30	0.3309	0.0006	0.0082	1.18E-05	0.0000	0.0000	0.0000	0.000	0.000643427	0.008162375	1.18024E-05	0.00E+00	0.00E+00	0.00E+00
7:35	0.3058	0.0006	0.0075	1.09E-05	0.0000	0.0000	0.0000	1.592	0.004	0.047	0.000	5.23E-05	0.00E+00	0.00E+00
7:45	0.4433	0.0009	0.0109	1.58E-05	0.0000	0.0000	0.0000	5.337	0.011	0.140	0.000	1.57E-04	0.00E+00	0.00E+00
8:00	0.4517	0.0010	0.0111	1.61E-05	0.0000	0.0000	0.0000	12.049	0.025	0.305	0.000	1.57E-04	1.65E-04	0.00E+00
8:15	0.4422	0.0008	0.0109	1.58E-05	0.0000	0.0000	0.0000	18.753	0.039	0.471	0.001	1.57E-04	3.31E-04	0.00E+00
8:30	0.4292	0.0007	0.0106	1.53E-05	0.0000	0.0000	0.0000	25.289	0.051	0.632	0.001	1.57E-04	3.31E-04	0.00E+00
8:45	0.3600	0.0005	0.0089	1.28E-05	0.0000	0.0000	0.0000	31.208	0.060	0.778	0.001	1.57E-04	3.31E-04	0.00E+00
9:00	0.4080	0.0004	0.0101	1.38E-05	0.0000	0.0000	0.0000	36.968	0.066	0.920	0.001	1.57E-04	3.31E-04	0.00E+00
9:15	0.4019	0.0004	0.0099	1.29E-05	0.0000	0.0000	0.0000	43.042	0.072	1.070	0.002	1.57E-04	3.31E-04	0.00E+00
9:30	0.4174	0.0005	0.0103	1.34E-05	0.0000	0.0000	0.0000	49.187	0.079	1.221	0.002	1.57E-04	3.31E-04	0.00E+00
9:45	0.4049	0.0005	0.0100	1.30E-05	0.0000	0.0000	0.0000	55.354	0.086	1.373	0.002	1.57E-04	3.31E-04	0.00E+00
10:00	0.3991	0.0005	0.0098	1.53E-05	0.0000	0.0000	0.0000	61.385	0.093	1.522	0.002	1.57E-04	3.31E-04	0.00E+00
10:15	0.4088	0.0007	0.0101	1.83E-05	0.0000	0.0000	0.0000	67.444	0.102	1.671	0.002	1.57E-04	3.31E-04	0.00E+00
10:30	0.4153	0.0010	0.0102	1.86E-05	0.0000	0.0000	0.0000	73.625	0.115	1.824	0.003	1.57E-04	3.31E-04	0.00E+00
10:45	0.4176	0.0009	0.0103	1.87E-05	0.0000	0.0000	0.0000	79.872	0.129	1.978	0.003	1.57E-04	3.31E-04	0.00E+00
11:00	0.4289	0.0007	0.0106	1.77E-05	0.0000	0.0000	0.0000	86.221	0.142	2.135	0.003	1.57E-04	3.31E-04	0.00E+00
11:15	0.4116	0.0005	0.0101	1.54E-05	0.0000	0.0000	0.0000	92.524	0.151	2.290	0.003	1.57E-04	3.31E-04	0.00E+00
11:30	0.4227	0.0002	0.0104	1.58E-05	0.0000	0.0000	0.0000	98.781	0.156	2.444	0.004	1.57E-04	3.31E-04	0.00E+00
11:45	0.3906	0.0005	0.0096	1.46E-05	0.0000	0.0000	0.0000	104.881	0.161	2.595	0.004	1.57E-04	3.31E-04	0.00E+00
12:00	0.3383	0.0007	0.0083	1.38E-05	0.0000	0.0000	0.0000	110.348	0.170	2.730	0.004	1.57E-04	3.31E-04	0.00E+00
12:15	0.2868	0.0006	0.0071	1.26E-05	0.0000	0.0000	0.0000	115.037	0.180	2.845	0.004	1.57E-04	3.31E-04	0.00E+00
12:30	0.2341	0.0005	0.0058	1.03E-05	0.0000	0.0000	0.0000	118.944	0.188	2.942	0.005	1.57E-04	3.31E-04	0.00E+00
12:45	0.2019	0.0004	0.0050	8.86E-06	0.0000	0.0000	0.0000	122.214	0.195	3.022	0.005	1.57E-04	3.31E-04	0.00E+00
13:00	0.1666	0.0003	0.0041	8.99E-06	0.0000	0.0000	0.0000	124.977	0.200	3.091	0.005	1.57E-04	3.31E-04	0.00E+00
13:15	0.1354	0.0002	0.0033	8.67E-06	0.0000	0.0000	0.0000	127.241	0.204	3.146	0.005	1.57E-04	3.31E-04	0.00E+00
13:30	0.1173	0.0002	0.0029	7.51E-06	0.0000	0.0000	0.0000	129.136	0.207	3.193	0.005	1.57E-04	3.31E-04	0.00E+00
13:45	0.0982	0.0002	0.0024	6.29E-06	0.0000	0.0000	0.0000	130.752	0.211	3.233	0.005	1.57E-04	3.31E-04	0.00E+00
14:00	0.0855	0.0002	0.0021	3.60E-06	0.0000	0.0000	0.0000	132.130	0.214	3.267	0.005	1.57E-04	3.31E-04	0.00E+00
14:15	0.0285	0.0001	0.0007	5.74E-07	0.0000	0.0000	0.0000	132.985	0.217	3.288	0.005	1.57E-04	3.31E-04	0.00E+00
14:30	0.0592	0.0002	0.0015	1.19E-06	0.0000	0.0000	0.0000	133.643	0.219	3.304	0.005	1.57E-04	3.31E-04	0.00E+00
14:45	0.0361	0.0001	0.0009	7.27E-07	0.0000	0.0000	0.0000	134.358	0.221	3.322	0.005	1.57E-04	3.31E-04	0.00E+00
15:00	0.0451	0.0002	0.0011	2.42E-06	0.0000	0.0000	0.0000	134.967	0.223	3.337	0.005	1.57E-04	3.31E-04	0.00E+00
15:15	0.0333	0.0001	0.0008	2.90E-06	0.0000	0.0000	0.0000	135.555	0.224	3.352	0.005	1.57E-04	3.31E-04	0.00E+00
15:30	0.0362	0.0001	0.0009	3.15E-06	0.0000	0.0000	0.0000	136.077	0.226	3.364	0.005	1.57E-04	3.31E-04	0.00E+00
15:45	0.0296	0.0001	0.0007	2.57E-06	0.0000	0.0000	0.0000	136.571	0.227	3.377	0.005	1.57E-04	3.31E-04	0.00E+00
16:00	0.0198	0.0001	0.0005	2.25E-06	0.0000	0.0000	0.0000	136.942	0.228	3.386	0.005	1.57E-04	3.31E-04	0.00E+00
16:15	0.0243	0.0001	0.0006	3.40E-06	0.0000	0.0000	0.0000	137.272	0.229	3.394	0.006	1.57E-04	3.31E-04	0.00E+00
16:30	0.0164	0.0000	0.0004	2.29E-06	0.0000	0.0000	0.0000	137.577	0.229	3.401	0.006	1.57E-04	3.31E-04	0.00E+00
16:45	0.0164	0.0000	0.0004	2.30E-06	0.0000	0.0000	0.0000	137.823	0.230	3.408	0.006	1.57E-04	3.31E-04	0.00E+00
17:00	0.0132	0.0000	0.0003	1.85E-06	0.0000	0.0000	0.0000	138.045	0.231	3.413	0.006	1.57E-04	3.31E-04	0.00E+00
17:15	0.0117	0.0000	0.0003	1.63E-06	0.0000	0.0000	0.0000	138.231	0.231	3.418	0.006	1.57E-04	3.31E-04	0.00E+00
17:30	0.0098	0.0000	0.0002	1.37E-06	0.0000	0.0000	0.0000	138.392	0.232	3.422	0.006	1.57E-04	3.31E-04	0.00E+00
17:45	0.0112	0.0000	0.0003	1.56E-06	0.0000	0.0000	0.0000	138.549	0.232	3.425	0.006	1.57E-04	3.31E-04	0.00E+00
18:00	0.0101	0.0000	0.0003	1.42E-06	0.0000	0.0000	0.0000	138.709	0.232	3.429	0.006	1.57E-04	3.31E-04	0.00E+00
18:15	0.0079	0.0000	0.0002	1.10E-06	0.0000	0.0000	0.0000	138.845	0.233	3.433	0.006	1.57E-04	3.31E-04	0.00E+00
18:30	0.0086	0.0000	0.0002	1.21E-06	0.0000	0.0000	0.0000	138.968	0.233	3.436	0.006	1.57E-04	3.31E-04	0.00E+00
18:45	0.0069	0.0000	0.0002	9.62E-07	0.0000	0.0000	0.0000	139.085	0.233	3.439	0.006	1.57E-04	3.31E-04	0.00E+00
19:00	0.0000	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000	139.136	0.233	3.440	0.006	1.57E-04	3.31E-04	0.00E+00
19:15	0.0000	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000	139.136	0.233	3.440	0.006	1.57E-04	3.31E-04	0.00E+00
19:30	0.0000	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000	139.136	0.233	3.440	0.006	1.57E-04	3.31E-04	0.0000E+00
								O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
								Sum of components=		142.82				
										VOC in gas/ VOC fed		0.018%	0.441%	0.000%

S Kujawa									
8/18/2003				**Test Results**	Str RPM:		Start		
TEST RUN	**F-16**								
	Results								
	Product slurry Sp. Gr.:	1.04							
	Final Product Slurry, ml:	**595**							
	Final Product Slurry, gm:	**619.4**							
	Dewar Flask net wt., gm	**0.6152**							
	Liquid/slurry Product, gm:	**620.0**		(Slurry Wt, 100% H2O2/O2 RXN):	635				
	Product Gas Weight, gm:	142.3							
	Product Wt, gm:	762.3							
	Total Charge Weight, gm:	**776.3**							
	Overall Mass Balance								
	Mass Balance Closure:	98.2%							
	Mass balance w/o gas:	80%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene		Anal. code			
	Slurry analysis, 1, mg/kg:	1.930	U	Slurry analysis, 1, mg/kg:	0.605	J			
	Slurry analysis, 2, mg/kg:	1.960	U	Slurry analysis, 2, mg/kg:	4.920	J			
	Avg., mg/kg	1.945		Avg., mg/kg	2.763				
	Total, mg:	1.205		Total, mg:	1.711				
	TCE, DRE, %	99.86%		HCB, DRE, %	71.48%				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	1.930	U	Slurry analysis, 1, mg/kg:	4.730	U			
	Slurry analysis, 2, mg/kg:	1.960	U	Slurry analysis, 2, mg/kg:	4.920	U			
	Avg., mg/kg	1.945		Avg., mg/kg	4.825				
	Total, mg:	1.205		Total, mg:	2.989				
							Run time:	12	Hours
	PCE, DRE, %	98.39%		BP, DRE, %	0.38%		Run Temp:	89.1	deg C
							H2O2 vol:	500	ml
	1,1,1-TriChloroEthane			Aroclor 1260					
	Slurry analysis, 1, mg/kg:	1.930	U	Slurry analysis, 1, mg/kg:	1.600				
	Slurry analysis, 2, mg/kg:	1.960	U	Slurry analysis, 2, mg/kg:					
	Avg., mg/kg	1.945		Avg., mg/kg	1.600				
	Total, mg:	1.205		Total, mg:	0.991				
	TCA, DRE, %	98.51%		Aroclor, DRE, %	92.66%				
	BEHP								
	Slurry analysis, 1, mg/kg:	29.500							
	Slurry analysis, 2, mg/kg:	27.400							
	Avg., mg/kg	28.450							
	Total, mg:	17.622							
	BEHP, DRE, %	89.36%							
	VOA and SVOA								
	not yet available. DRE is a place holder.								
	Stk 8/11/03								

S Kujawa								
8/18/2003		**Heat Balance**						
TEST RUN	**F-16**							
	Condenser Bath			Oil Bath				
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**			
				The heat balance and heat generation calculations are very uncertain				
Check heat transfer coef and do error				due to lack of physical properties for the heating oil. Efforts are				
				being made to determine operating heat capacities and densities.				
				Boss DS oil density, gm/ml	0.873			
				Boss DS oil heat cap. cal/gm/deg C	0.4			
8:50	Water Return Temp, Deg C	**6.6**		Oil Return Temp, Deg C	**78.8**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**56.15**		Bucket ck time, sec	**96.71**			
	Flow rate, ml/min	1069		Flow rate, ml/min	620			
	Enthalpy change, calorie/min:	1710		Enthalpy change, calorie/min:	-4593			
	Flask Top Surface Temp., C	**65.3**		Flask bottom Surface Temp., C	**73.6**			
	Flask Top Surface Temp., F	150		Flask bottom Surface Temp., F	164			
	Air Temp. ,F	**65.4**		Air Temp. ,F	**65.4**			
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1269		Convective Loss, cal/min	2106			
	Radiative Loss, cal/min	546		Radiative Loss, cal/min	944			
	Flask top Heat Loss, cal/min	1815		Flask bottom Heat Loss, cal/min	3050	4865		
	Reactor Temperature, C	**91.7**		P1 Gas Temp. Deg C.	**20.5**			
	Peroxide Temperature, F	65.4		Gas Flow Rate, gm/min	0.403		Correlated losses, cal/min	4874
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0119		Reflux Gas Delta H, cal/min	693
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	6.61		Revised Acc/generation, cal/min	-1114
	Peroxide Enthalpy Change, cal/min	140.4						
				Accumulation/Generation, cal/min	-2129			
	Correlated losses, cal/min	4874						
	Reflux Gas Delta H, cal/min	693						
	Revised Acc/generation, cal/min	-1114						
9:50	Water Return Temp, Deg C	**6.8**		Oil Return Temp, Deg C	**79.2**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**56.15**		Bucket ck time, sec	**96.71**			
	Flow rate, ml/min	1069		Flow rate, ml/min	620			
	Enthalpy change, calorie/min:	1923		Enthalpy change, calorie/min:	-4506			
	Flask Top Surface Temp., C	**68**		Flask bottom Surface Temp., C	**72.5**			
	Flask Top Surface Temp., F	154		Flask bottom Surface Temp., F	163			
	Air Temp. ,F	**67.2**		Air Temp. ,F	**67.2**			
	Overall HT coef. Btu/hr/F/sq ft	2.7		Overall HT coef.	2.7			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1291		Convective Loss, cal/min	1989			
	Radiative Loss, cal/min	576		Radiative Loss, cal/min	907			
	Flask top Heat Loss, cal/min	1867		Flask bottom Heat Loss, cal/min	2896	4763		
	Reactor Temperature, C	**91.9**		P1 Gas Temp. Deg C.	**21.5**			
	Peroxide Temperature, F	67.2		Gas Flow Rate, gm/min	0.420		Correlated losses, cal/min	4807
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0124		Reflux Gas Delta H, cal/min	721
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	6.88		Revised Acc/generation, cal/min	-1161
	Peroxide Enthalpy Change, cal/min	138.9						
				Accumulation/Generation, cal/min	-2326			
	Correlated losses, cal/min	4807						
	Reflux Gas Delta H, cal/min	721						
	Revised Acc/generation, cal/min	-1161						

10:50	Water Return Temp, Deg C	**6.9**		Oil Return Temp, Deg C	**79.1**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**56.25**		Bucket ck time, sec	**95.6**			
	Flow rate, ml/min	1067		Flow rate, ml/min	628			
	Enthalpy change, calorie/min:	2027		Enthalpy change, calorie/min:	-4581			
	Flask Top Surface Temp., C	**69.7**		Flask bottom Surface Temp., C	**72.8**			
	Flask Top Surface Temp., F	157		Flask bottom Surface Temp., F	163			
	Air Temp. ,F	**69.8**		Air Temp. ,F	**69.8**			
	Overall HT coef. Btu/hr/F/sq ft	2.7		Overall HT coef.	2.7			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1298		Convective Loss, cal/min	1946			
	Radiative Loss, cal/min	588		Radiative Loss, cal/min	895			
	Flask top Heat Loss, cal/min	1886		Flask bottom Heat Loss, cal/min	2841	4726		
	Reactor Temperature, C	**92.5**		P1 Gas Temp. Deg C.	**23**			
	Peroxide Temperature, F	69.8		Gas Flow Rate, gm/min	0.426		Correlated losses, cal/min	4708
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0126		Reflux Gas Delta H, cal/min	731
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	6.98		Revised Acc/generation, cal/min	-996
	Peroxide Enthalpy Change, cal/min	137.3						
				Accumulation/Generation, cal/min	-2317			

S Kujawa								
8/18/2003		**Heat Balance**						
TEST RUN	**F-16**							
	Condenser Bath			Oil Bath				
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**			
				The heat balance and heat generation calculations are very uncertain				
				due to lack of physical properties for the heating oil. Efforts are				
				being made to determine operating heat capacities and densities.				
				Boss DS oil density, gm/ml	0.873			
				Boss DS oil heat cap. cal/gm/deg C	0.4			
11:35	Water Return Temp, Deg C	**6.9**		Oil Return Temp, Deg C	**80.8**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**56.13**		Bucket ck time, sec	**96.56**			
	Flow rate, ml/min	1069		Flow rate, ml/min	621			
	Enthalpy change, calorie/min:	2031		Enthalpy change, calorie/min:	-4166			
	Flask Top Surface Temp., C	**71.9**		Flask bottom Surface Temp., C	**74.7**			
	Flask Top Surface Temp., F	161		Flask bottom Surface Temp., F	166			
	Air Temp. ,F	**73.4**		Air Temp. ,F	**73.4**			
	Overall HT coef. Btu/hr/F/sq ft	2.65		Overall HT coef.	2.65			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1279		Convective Loss, cal/min	1906			
	Radiative Loss, cal/min	602		Radiative Loss, cal/min	909			
	Flask top Heat Loss, cal/min	1881		Flask bottom Heat Loss, cal/min	2815	4696		
	Reactor Temperature, C	**93.4**		P1 Gas Temp. Deg C.	**25**			
	Peroxide Temperature, F	73.4		Gas Flow Rate, gm/min	0.426		Correlated losses, cal/min	4575
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0126		Reflux Gas Delta H, cal/min	732
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	6.98		Revised Acc/generation, cal/min	-1140
	Peroxide Enthalpy Change, cal/mir	0.0						
				Accumulation/Generation, cal/min	-2568			
	Correlated losses, cal/min	4575						
	Reflux Gas Delta H, cal/min	732						
	Revised Acc/generation, cal/min	-1140						
12:40	Water Return Temp, Deg C	**6.9**		Oil Return Temp, Deg C	**79.9**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**56.16**		Bucket ck time, sec	**96.78**			
	Flow rate, ml/min	1068		Flow rate, ml/min	620			
	Enthalpy change, calorie/min:	2030		Enthalpy change, calorie/min:	-4351			
	Flask Top Surface Temp., C	**70.7**		Flask bottom Surface Temp., C	**75.3**			
	Flask Top Surface Temp., F	159		Flask bottom Surface Temp., F	168			
	Air Temp. ,F	**77**		Air Temp. ,F	**77**			
	Overall HT coef. Btu/hr/F/sq ft	2.7		Overall HT coef.	2.7			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1218		Convective Loss, cal/min	1889			
	Radiative Loss, cal/min	564		Radiative Loss, cal/min	895			
	Flask top Heat Loss, cal/min	1782		Flask bottom Heat Loss, cal/min	2785	4567		
	Reactor Temperature, C	**91.5**		P1 Gas Temp. Deg C.	**27.5**			
	Peroxide Temperature, F	77		Gas Flow Rate, gm/min	0.223		Correlated losses, cal/min	4409
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0066		Reflux Gas Delta H, cal/min	383
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	3.65		Revised Acc/generation, cal/min	-440
	Peroxide Enthalpy Change, cal/mir	0.0						
				Accumulation/Generation, cal/min	-2249			

S Kujawa								
8/18/2003		**Heat Balance**						
TEST RUN	**F-16**							
	Condenser Bath			Oil Bath				
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**			
		The heat balance and heat generation calculations are very uncertain due to lack of physical properties for the heating oil. Efforts are being made to determine operating heat capacities and densities.						
				Boss DS oil density, gm/ml	0.873			
				Boss DS oil heat cap. cal/gm/deg	0.4			
13:40	Water Return Temp, Deg C	**7**		Oil Return Temp, Deg C	**81.5**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**57.66**		Bucket ck time, sec	**96.54**			
	Flow rate, ml/min	1041		Flow rate, ml/min	622			
	Enthalpy change, calorie/min:	2081		Enthalpy change, calorie/min:	-4015			
	Flask Top Surface Temp., C	**70.9**		Flask bottom Surface Temp., C	**75.7**			
	Flask Top Surface Temp., F	160		Flask bottom Surface Temp., F	168			
	Air Temp. ,F	**80**		Air Temp. ,F	**80**			
	Overall HT coef. Btu/hr/F/sq ft	2.7		Overall HT coef.	2.7			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1179		Convective Loss, cal/min	1842			
	Radiative Loss, cal/min	551		Radiative Loss, cal/min	881			
	Flask top Heat Loss, cal/min	1729		Flask bottom Heat Loss, cal/min	2723	4452		
	Reactor Temperature, C	**90.1**		P1 Gas Temp. Deg C.	**28.5**			
	Peroxide Temperature, F	80		Gas Flow Rate, gm/min	0.110		Correlated losses, cal/min	4342
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0033		Reflux Gas Delta H, cal/min	189
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	1.80		Revised Acc/generation, cal/min	-516
	Peroxide Enthalpy Change, cal/mir	0.0						
				Accumulation/Generation, cal/min	-2520			
	Correlated losses, cal/min	4342						
	Reflux Gas Delta H, cal/min	189						
	Revised Acc/generation, cal/min	-516						
14:53	Water Return Temp, Deg C	**6.9**		Oil Return Temp, Deg C	**79.8**			
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**			
	Bucket ck time, sec	**55.44**		Bucket ck time, sec	**96.43**			
	Flow rate, ml/min	1082		Flow rate, ml/min	622			
	Enthalpy change, calorie/min:	2056		Enthalpy change, calorie/min:	-4389			
	Flask Top Surface Temp., C	**65.2**		Flask bottom Surface Temp., C	**74.4**			
	Flask Top Surface Temp., F	149		Flask bottom Surface Temp., F	166			
	Air Temp. ,F	**80.6**		Air Temp. ,F	**80.6**			
	Overall HT coef. Btu/hr/F/sq ft	3		Overall HT coef.	3			
	Top flask Area, in^2	188		bottom flask Area, in^2	265			
	emisivity	0.94		emisivity	0.94			
	Convective Loss, cal/min	1131		Convective Loss, cal/min	1978			
	Radiative Loss, cal/min	463		Radiative Loss, cal/min	847			
	Flask top Heat Loss, cal/min	1594		Flask bottom Heat Loss, cal/min	2826	4420		
	Reactor Temperature, C	**86.3**		P1 Gas Temp. Deg C.	**29.5**			
	Peroxide Temperature, F	80.6		Gas Flow Rate, gm/min	0.042		Correlated losses, cal/min	4276
	Peroxide Flow Rate, ml/min	**0**		Water Vap. gm/min	0.0012		Reflux Gas Delta H, cal/min	71
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.68		Revised Acc/generation, cal/min	42
	Peroxide Enthalpy Change, cal/mir	0.0						
				Accumulation/Generation, cal/min	-2088			
	Correlated losses, cal/min	4276						
	Reflux Gas Delta H, cal/min	71						
	Revised Acc/generation, cal/min	42						

S Kujawa											
9/3/2003					Reactor Charge						
TEST RUN	**F-22**										
			SURROGATE			Target		Actual			
Component		Mol. Wt.			Grams	Milliliters	Micro L	Grams	Milliliters	Micro L	gmmoles	gmol C
	Charge:				150							
water					120.0442	120.04		**120.382**				
hydraulic oil	C26H54	366.7			2.0938	2.38		**2.073**			0.0057	0.1470
cutting oil	C26H64	366.7			2.0938	2.38		**2.049**			0.0056	0.1453
Al2O3					0.3349	0.08	83.9	**0.3356**				
CaO					0.5413	0.16	163.0	**0.5411**				
Cr2O3					0.2326	0.04	44.6	**0.2327**				
Fe2O3					1.3032	0.44	435.1	**1.3032**				
MgO					0.7269	0.38	375.9	**0.7270**				
MnO					0.4254	0.08	82.1	**0.4249**				
SiO2					8.3907	3.71	3712.7	**8.3915**				
Na3PO4					12.2584	4.83	4831.8	**12.2585**				
KOH					0.3224	0.16	157.8	**0.3230**				
Hg					0.0516	0.00	3.8	**0.0574**		4		
Aroclor-1260	C12Cl6.36	373			0.0070	0.0045	4.5	**0.0428**			1.15E-04	0.0014
TCE		131			0.8431	0.58	577.5	**0.8496**		580	0.0065	0.0130
PCE		166			0.0747	0.05	45.8	**0.0754**		46	0.0005	0.0009
TCA		133			0.0941	0.07	70.2	**0.0950**		70	0.0007	0.0014
BEHP	C22H38O4	390.54			0.1619	0.17	165.2	**0.1663**		170	0.0004	0.0094
	Total:				150.0	135.56		150.3				
			REAGENTS									
Component					**Grams**	**Milliliters**	**Micro L**	**Grams**	**Milliliters**	**Micro L**		
HCB	C6Cl6	284.8						**0.0069**			2.42E-05	**0.0001**
BP	C12H10	154.2						**0.0032**			2.08E-05	**0.0002**
FeSO4 7H2O					1.5			**1.5013**				
H2O2 (50%)					720	600		720	**600**			
H2SO4 (con)								**14.1492**				
NaOH (4 M)								**1.933**				
	Total:				871.5			887.9				0.3187

	S Kujawa													
	9/3/2003													
	TEST RUN	**F-22**												
Run Time	**Gas Vol, cc**	**Time, sec**	**accm**	**Temp, C**	**P baro**	**MW**	**Density**	**gm/min**	**Time delta**	**Rate avg**	**Mass delta**	**Mass sum**		**Rctr T**
					psia		lb/ft^3	0	min.	gm/min	gm	gm		Deg C
8:30		**1**	0	**22**	**12.13**	31.7	0.067	0.000	0.0	0.000	0.00	0.0		**82.2**
8:35	**50**	**16.75**	179	**21**	**12.13**	32.2	0.069	0.197	5.0	0.099	0.49	0.5		**83.2**
8:45	**50**	**9**	333	**21**	**12.13**	31.8	0.068	0.363	10.0	0.280	2.80	3.3		**85.5**
9:00	**50**	**7.88**	381	**21**	**12.13**	31.8	0.068	0.414	15.0	0.389	5.83	9.1		**91.5**
9:15	**50**	**7.75**	387	**21**	**12.13**	31.8	0.068	0.421	15.0	0.418	6.26	15.4		**91.4**
9:30	**50**	**7.19**	417	**21**	**12.13**	31.8	0.068	0.454	15.0	0.438	6.56	22.0		**92.7**
9:45	**50**	**7.22**	416	**21**	**12.13**	31.8	0.068	0.452	15.0	0.453	6.79	28.8		**92.8**
10:00	**50**	**7.13**	421	**21**	**12.13**	31.8	0.068	0.458	15.0	0.455	6.82	35.6		**92.9**
10:15	**50**	7.115	422	**21**	**12.13**	31.8	0.068	0.459	15.0	0.458	6.88	42.5		**93**
10:30	**50**	**7.69**	390	**23**	**12.13**	31.8	0.067	0.422	15.0	0.440	6.60	49.1		**92.9**
10:45	**50**	**7.72**	389	**21**	**12.13**	31.8	0.068	0.423	15.0	0.422	6.34	55.4		**92.7**
11:00	**50**	**8.25**	364	**22**	**12.13**	31.8	0.068	0.394	15.0	0.409	6.13	61.5		**91.8**
11:15	**50**	**8.22**	365	**22**	**12.13**	31.8	0.068	0.396	15.0	0.395	5.93	67.5		**91.7**
11:30	**50**	**7.69**	390	**23**	**12.13**	31.8	0.067	0.422	15.0	0.408	6.12	73.6		**91.9**
11:45	**50**	**7.72**	389	**24**	**12.13**	31.8	0.067	0.419	15.0	0.420	6.30	79.9		**92.3**
12:00	**50**	**7.59**	395	**24**	**12.13**	31.8	0.067	0.426	15.0	0.422	6.33	86.2		**92.5**
12:15	**50**	**7.5**	400	**25**	**12.13**	31.8	0.067	0.429	15.0	0.428	6.41	92.6		**92.8**
12:30	**50**	**7.62**	394	**24**	**12.13**	31.8	0.067	0.424	15.0	0.427	6.40	99.0		**92.5**
12:45	**50**	**7.56**	397	**25.5**	**12.13**	31.8	0.067	0.425	15.0	0.425	6.37	105.4		**92.4**
13:00	**50**	**7.72**	389	**26.5**	**12.13**	31.8	0.067	0.415	15.0	0.420	6.30	111.7		**92.5**
13:15	**50**	**7.6**	395	**26.5**	**12.13**	31.8	0.067	0.422	15.0	0.418	6.28	118.0		**92.3**
13:30	**50**	**7.68**	391	**27**	**12.13**	31.8	0.067	0.417	15.0	0.419	6.29	124.3		**93**
13:45	**50**	**8.53**	352	**27**	**12.13**	31.8	0.067	0.375	15.0	0.396	5.94	130.2		**93**
14:00	**50**	**9.47**	317	**29**	**12.13**	31.8	0.066	0.336	15.0	0.355	5.33	135.5		**92.6**
14:15	**50**	**10.82**	277	**29**	**12.13**	31.8	0.066	0.294	15.0	0.315	4.72	140.3		**92.2**
14:30	**50**	**12.25**	245	**29**	**12.13**	31.8	0.066	0.260	15.0	0.277	4.15	144.4		**91.8**
14:45	**50**	**13.4**	224	**29**	**12.13**	31.8	0.066	0.237	15.0	0.248	3.73	148.1		**91.3**
15:00	**50**	**14.37**	209	**25**	**12.13**	31.8	0.067	0.224	15.0	0.231	3.46	151.6		**90.7**
15:15	**50**	**17.44**	172	**29**	**12.13**	31.8	0.066	0.182	15.0	0.203	3.05	154.7		**90.3**
15:30	**50**	**19.38**	155	**29**	**12.13**	31.8	0.066	0.164	15.0	0.173	2.60	157.3		**90**
15:45	**50**	**22.34**	134	**29**	**12.13**	31.8	0.066	0.143	15.0	0.153	2.30	159.6		**89.9**
16:00	**50**	**25.5**	118	**29**	**12.13**	31.8	0.066	0.125	15.0	0.134	2.01	161.6		**89.3**
16:15	**50**	**28.72**	104	**29**	**12.13**	31.8	0.066	0.111	15.0	0.118	1.77	163.3		**89.3**
16:30	**10**	**6.6**	91	**29**	**12.13**	31.8	0.066	0.097	15.0	0.104	1.56	164.9		**89.3**
16:45	**10**	**7.25**	83	**29**	**12.13**	31.8	0.066	0.088	15.0	0.092	1.38	166.3		**88.6**
17:00	**10**	**8.47**	71	**29**	**12.13**	31.8	0.066	0.075	15.0	0.082	1.22	167.5		**88.9**
17:15	**10**	**8.94**	67	**29**	**12.13**	31.9	0.066	0.071	15.0	0.073	1.10	168.6		**88.6**
17:30	**10**	**11.25**	53	**29**	**12.13**	31.9	0.066	0.057	15.0	0.064	0.96	169.5		**88.3**
17:45	**10**	**11.93**	50	**28**	**12.13**	31.9	0.066	0.054	15.0	0.055	0.83	170.4		**88.9**
18:00	**10**	**13.37**	45	**28**	**12.13**	31.9	0.067	0.048	15.0	0.051	0.76	171.1		**88.8**
18:15	**10**	**13.37**	45	**28**	**12.13**	31.9	0.067	0.048	15.0	0.048	0.72	171.9		**88.7**
18:30	**10**	**16.47**	36	**28**	**12.13**	31.9	0.067	0.039	15.0	0.043	0.65	172.5		**88.2**
18:45	**10**	**18.69**	32	**28**	**12.13**	31.9	0.067	0.034	15.0	0.037	0.55	173.0		**88**
19:00	**10**	**21.44**	28	**28**	**12.13**	31.9	0.067	0.030	15.0	0.032	0.48	173.5		**87**
19:15	**10**	**24.43**	25	**27**	**12.13**	31.9	0.067	0.026	15.0	0.028	0.42	174.0		**86.5**
19:30	**10**	**30.69**	20	**25**	**12.13**	31.9	0.067	0.021	15.0	0.024	0.36	174.3		**86.1**
19:45	**10**	**35.59**	24	**25**	**12.13**	31.9	0.067	0.025	15.0	0.023	0.35	174.7		**85.3**
20:00	**10**	**32.81**	18	**23**	**12.13**	31.9	0.068	0.020	15.0	0.023	0.34	175.0		**86**
20:15	**10**	**34.19**	18	**25**	**12.13**	31.9	0.067	0.019	15.0	0.019	0.29	175.3		**87.1**
20:30	**10**	**33.72**	18	**25**	**12.13**	31.9	0.067	0.019	15.0	0.019	0.29	175.6		**87.8**
			204				Avg's:	0.237	720.0			171.0	Avg:	**90.0**

	S Kujawa									
	9/3/2003									
	TEST RUN	**F-22**								
Run Time	**% O2**	**% CO2**	**% H2O**	**% CO**	**PPMv TCE**	**PPMv PCE**	**PPMv TCA**	**MW**		
8:30	97.9%	**0.0%**	2.1%					31.7		
8:35	94.1%	**3.8%**	2.1%					32.2		
8:45	96.9%	**1.0%**	2.1%	**0.0114%**				31.8		
9:00	97.4%	**0.5%**	2.1%					31.8		
9:15	97.4%	**0.5%**	2.1%					31.8		
9:30	97.4%	**0.5%**	2.1%					31.8		
9:45	97.4%	**0.5%**	2.1%					31.8		
10:00	97.3%	**0.6%**	2.1%	**0.0066%**				31.8		
10:15	97.3%	**0.6%**	2.1%					31.8		
10:30	97.3%	**0.6%**	2.1%					31.8		
10:45	97.2%	**0.7%**	2.1%					31.8		
11:00	97.3%	**0.6%**	2.1%					31.8		
11:15	97.3%	**0.6%**	2.1%					31.8		
11:30	97.2%	**0.7%**	2.1%					31.8		
11:45	97.3%	**0.6%**	2.1%	**0.0033%**				31.8		
12:00	97.3%	**0.6%**	2.1%					31.8		
12:15	97.3%	**0.6%**	2.1%					31.8		
12:30	97.3%	**0.6%**	2.1%					31.8		
12:45	97.3%	**0.6%**	2.1%					31.8		
13:00	97.3%	**0.6%**	2.1%	**0.0024%**				31.8		
13:15	97.3%	**0.6%**	2.1%					31.8		
13:30	97.3%	**0.6%**	2.1%					31.8		
13:45	97.3%	**0.6%**	2.1%	**0.0029%**				31.8		
14:00	97.3%	**0.6%**	2.1%					31.8		
14:15	97.2%	**0.7%**	2.1%					31.8		
14:30	97.2%	**0.7%**	2.1%					31.8		
14:45	97.1%	**0.8%**	2.1%	**0.0051%**				31.8		
15:00	97.1%	**0.8%**	2.1%					31.8		
15:15	97.0%	**0.9%**	2.1%					31.8		
15:30	97.0%	**0.9%**	2.1%					31.8		
15:45	96.8%	**1.1%**	2.1%	**0.0092%**				31.8		
16:00	96.9%	**1.0%**	2.1%					31.8		
16:15	96.8%	**1.1%**	2.1%					31.8		
16:30	96.7%	**1.2%**	2.1%					31.8		
16:45	96.7%	**1.2%**	2.1%					31.8		
17:00	96.7%	**1.2%**	2.1%					31.8		
17:15	96.6%	**1.3%**	2.1%					31.9		
17:30	96.6%	**1.3%**	2.1%					31.9		
17:45	96.6%	**1.3%**	2.1%					31.9		
18:00	96.5%	**1.4%**	2.1%					31.9		
18:15	96.5%	**1.4%**	2.1%					31.9		
18:30	96.4%	**1.5%**	2.1%					31.9		
18:45	96.4%	**1.5%**	2.1%					31.9		
19:00	96.3%	**1.6%**	2.1%					31.9		
19:15	96.3%	**1.6%**	2.1%					31.9		
19:30	96.3%	**1.6%**	2.1%					31.9		
19:45	96.3%	**1.6%**	2.1%					31.9		
20:00	96.1%	**1.8%**	2.1%					31.9		
20:15	96.1%	**1.8%**	2.1%					31.9		
20:30	96.0%	**1.9%**	2.1%					31.9		

	S Kujawa													
	8/27/2003													
	TEST RUN	**F-22**												
	Instantaneous rates:							**Integrated quantities:**						
	O2, gm/min	CO2, g/m	H2O g/m	CO g/m	TCE g/m	PCE g/m	TCA g/m	O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
8:30	0.0000	0.0000	0.0000	0.00E+00	0.00E+00	0.0000	0.0000	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.00E+00
8:35	0.1847	0.0103	0.0023	0.00E+00	0.00E+00	0.0000	0.0000	0.5	0.026	0.006	0.000	0.000	0.00E+00	0.00E+00
8:45	0.3539	0.0050	0.0043	3.64E-05	0.00E+00	0.0000	0.0000	3	0.1	0.0	0.000	0.000	0.00E+00	0.00E+00
9:00	0.4064	0.0029	0.0050	0.00E+00	0.00E+00	0.0000	0.0000	9	0.2	0.1	0.000	0.000	0.00E+00	0.00E+00
9:15	0.4132	0.0029	0.0050	0.00E+00	0.00E+00	0.0000	0.0000	15	0.2	0.2	0.000	0.000	0.00E+00	0.00E+00
9:30	0.4454	0.0031	0.0054	0.00E+00	0.00E+00	0.0000	0.0000	21	0.3	0.3	0.000	0.000	0.00E+00	0.00E+00
9:45	0.4435	0.0031	0.0054	0.00E+00	0.00E+00	0.0000	0.0000	28	0.3	0.3	0.000	0.000	0.00E+00	0.00E+00
10:00	0.4486	0.0038	0.0055	2.66E-05	0.00E+00	0.0000	0.0000	35	0.3	0.4	0.001	0.000	0.00E+00	0.00E+00
10:15	0.4496	0.0038	0.0055	0.00E+00	0.00E+00	0.0000	0.0000	42	0.4	0.5	0.001	0.000	0.00E+00	0.00E+00
10:30	0.4132	0.0035	0.0050	0.00E+00	0.00E+00	0.0000	0.0000	48	0.5	0.6	0.001	0.000	0.00E+00	0.00E+00
10:45	0.4139	0.0041	0.0051	0.00E+00	0.00E+00	0.0000	0.0000	54	0.5	0.7	0.001	0.000	0.00E+00	0.00E+00
11:00	0.3864	0.0033	0.0047	0.00E+00	0.00E+00	0.0000	0.0000	60	0.6	0.7	0.001	0.000	0.00E+00	0.00E+00
11:15	0.3878	0.0033	0.0047	0.00E+00	0.00E+00	0.0000	0.0000	66	0.6	0.8	0.001	0.000	0.00E+00	0.00E+00
11:30	0.4127	0.0041	0.0050	0.00E+00	0.00E+00	0.0000	0.0000	72	0.7	0.9	0.001	0.000	0.00E+00	0.00E+00
11:45	0.4102	0.0035	0.0050	1.22E-05	0.00E+00	0.0000	0.0000	78	0.7	1.0	0.001	0.000	0.00E+00	0.00E+00
12:00	0.4172	0.0035	0.0051	0.00E+00	0.00E+00	0.0000	0.0000	84	0.8	1.0	0.001	0.000	0.00E+00	0.00E+00
12:15	0.4208	0.0036	0.0051	0.00E+00	0.00E+00	0.0000	0.0000	91	0.8	1.1	0.001	0.000	0.00E+00	0.00E+00
12:30	0.4156	0.0035	0.0051	0.00E+00	0.00E+00	0.0000	0.0000	97	0.9	1.2	0.001	0.000	0.00E+00	0.00E+00
12:45	0.4168	0.0035	0.0051	0.00E+00	0.00E+00	0.0000	0.0000	103	0.9	1.3	0.001	0.000	0.00E+00	0.00E+00
13:00	0.4067	0.0034	0.0050	8.78E-06	0.00E+00	0.0000	0.0000	109	1.0	1.3	0.001	0.000	0.00E+00	0.00E+00
13:15	0.4132	0.0035	0.0050	0.00E+00	0.00E+00	0.0000	0.0000	116	1.1	1.4	0.001	0.000	0.00E+00	0.00E+00
13:30	0.4082	0.0035	0.0050	0.00E+00	0.00E+00	0.0000	0.0000	122	1.1	1.5	0.001	0.000	0.00E+00	0.00E+00
13:45	0.3675	0.0031	0.0045	9.59E-06	0.00E+00	0.0000	0.0000	128	1.2	1.6	0.001	0.000	0.00E+00	0.00E+00
14:00	0.3288	0.0028	0.0040	0.00E+00	0.00E+00	0.0000	0.0000	133	1.2	1.6	0.001	0.000	0.00E+00	0.00E+00
14:15	0.2875	0.0028	0.0035	0.00E+00	0.00E+00	0.0000	0.0000	137	1.2	1.7	0.001	0.000	0.00E+00	0.00E+00
14:30	0.2540	0.0025	0.0031	0.00E+00	0.00E+00	0.0000	0.0000	141	1.3	1.7	0.001	0.000	0.00E+00	0.00E+00
14:45	0.2319	0.0026	0.0028	1.07E-05	0.00E+00	0.0000	0.0000	145	1.3	1.8	0.001	0.000	0.00E+00	0.00E+00
15:00	0.2192	0.0025	0.0027	0.00E+00	0.00E+00	0.0000	0.0000	148	1.4	1.8	0.001	0.000	0.00E+00	0.00E+00
15:15	0.1780	0.0023	0.0022	0.00E+00	0.00E+00	0.0000	0.0000	151	1.4	1.8	0.001	0.000	0.00E+00	0.00E+00
15:30	0.1602	0.0020	0.0020	0.00E+00	0.00E+00	0.0000	0.0000	154	1.4	1.9	0.001	0.000	0.00E+00	0.00E+00
15:45	0.1387	0.0022	0.0017	1.15E-05	0.00E+00	0.0000	0.0000	156	1.5	1.9	0.002	0.000	0.00E+00	0.00E+00
16:00	0.1216	0.0017	0.0015	0.00E+00	0.00E+00	0.0000	0.0000	158	1.5	1.9	0.002	0.000	0.00E+00	0.00E+00
16:15	0.1079	0.0017	0.0013	0.00E+00	0.00E+00	0.0000	0.0000	160	1.5	2.0	0.002	0.000	0.00E+00	0.00E+00
16:30	0.0938	0.0016	0.0012	0.00E+00	0.00E+00	0.0000	0.0000	161	1.5	2.0	0.002	0.000	0.00E+00	0.00E+00
16:45	0.0854	0.0015	0.0010	0.00E+00	0.00E+00	0.0000	0.0000	163	1.6	2.0	0.002	0.000	0.00E+00	0.00E+00
17:00	0.0731	0.0012	0.0009	0.00E+00	0.00E+00	0.0000	0.0000	164	1.6	2.0	0.002	0.000	0.00000	0.00000
17:15	0.0692	0.0013	0.0009	0.00E+00	0.00E+00	0.0000	0.0000	165	1.6	2.0	0.002	0.000	0.00E+00	0.00E+00
17:30	0.0550	0.0010	0.0007	0.00E+00	0.00E+00	0.0000	0.0000	166	1.6	2.0	0.002	0.000	0.00000	0.00000
17:45	0.0520	0.0010	0.0006	0.00E+00	0.00E+00	0.0000	0.0000	167	1.6	2.0	0.002	0.000	0.00E+00	0.00E+00
18:00	0.0464	0.0009	0.0006	0.00E+00	0.00E+00	0.0000	0.0000	167	1.6	2.0	0.002	0.000	0.00000	0.00000
18:15	0.0464	0.0009	0.0006	0.00E+00	0.00E+00	0.0000	0.0000	168	1.7	2.1	0.002	0.000	0.00E+00	0.00E+00
18:30	0.0376	0.0008	0.0005	0.00E+00	0.00E+00	0.0000	0.0000	169	1.7	2.1	0.002	0.000	0.00000	0.00000
18:45	0.0331	0.0007	0.0004	0.00E+00	0.00E+00	0.0000	0.0000	169	1.7	2.1	0.002	0.000	0.00E+00	0.00E+00
19:00	0.0288	0.0007	0.0004	0.00E+00	0.00E+00	0.0000	0.0000	170	1.7	2.1	0.002	0.000	0.00000	0.00000
19:15	0.0254	0.0006	0.0003	0.00E+00	0.00E+00	0.0000	0.0000	170	1.7	2.1	0.002	0.000	0.00E+00	0.00E+00
19:30	0.0204	0.0005	0.0003	0.00E+00	0.00E+00	0.0000	0.0000	171	1.7	2.1	0.002	0.000	0.00000	0.00000
19:45	0.0245	0.0006	0.0003	0.00E+00	0.00E+00	0.0000	0.0000	171	1.7	2.1	0.002	0.000	0.00000	0.00000
20:00	0.0191	0.0005	0.0002	0.00E+00	0.00E+00	0.0000	0.0000	171	1.7	2.1	0.002	0.000	0.00000	0.00000
20:15	0.0182	0.0005	0.0002	0.00E+00	0.00E+00	0.0000	0.0000	171	1.7	2.1	0.002	0.000	0.00000	0.00000
20:30	0.0185	0.0005	0.0002	0.00E+00	0.00E+00	0.0000	0.0000	172	1.7	2.1	0.002	0.000	0.00000	0.00000
								O2, gm	CO2, gm	H2O gm	CO gm	TCE gm	PCE gm	TCA gm
								Sum of components=		175.58				
										VOC in gas/ VOC fed		0.00%	0.00%	0.00%

S Kujawa									
9/3/2003				**Test Results**	Str RPM:	**444**	Start		
						516	14:32		
TEST RUN	**F-22**								
	Results								
	Product slurry Sp. Gr.:	1.04							
	Final Product Slurry, ml:	**686**							
	Final Product Slurry, gm:	**710.7**							
	Dewar Flask net wt., gm	**0.9854**							
	Liquid/slurry Product, gm:	**711.7**		(Slurry Wt, 100% H2O2/O2 RXN):	719				
	Product Gas Weight, gm:	175.6							
	Product Wt, gm:	887.3							
	Total Charge Weight, gm:	**887.9**							
	Overall Mass Balance								
	Mass Balance Closure:	99.9%							
	Mass balance w/o gas:	80%							
	Species Mass Results			**Species Mass Results**					
	TriChloroEthylene		Anal. code	HexachloroBenzene		Anal. code			
	Slurry analysis, 1, mg/kg:	1.950	U	Slurry analysis, 1, mg/kg:	0.670	J			
	Slurry analysis, 2, mg/kg:	1.440	J	Slurry analysis, 2, mg/kg:	4.760	U			
	Avg., mg/kg	1.695		Avg., mg/kg	2.715				
	Total, mg:	1.205		Total, mg:	1.930				
	TCE, DRE, %	99.86%		HCB, DRE, %	72.04%				
	TetraChloroEthylene			Bi-Phenyl					
	Slurry analysis, 1, mg/kg:	1.950	U	Slurry analysis, 1, mg/kg:	4.920	U			
	Slurry analysis, 2, mg/kg:	1.060	J	Slurry analysis, 2, mg/kg:	4.760	U			
	Avg., mg/kg	1.505		Avg., mg/kg	4.840				
	Total, mg:	1.070		Total, mg:	3.440				
	PCE, DRE, %	98.58%		BP, DRE, %	-7.49%		Run time:	12 Hours	
							Run Temp	90.0 deg C	
	1,1,1-TriChloroEthane			Aroclor 1260			H2O2 vol:	600 ml	
	Slurry analysis, 1, mg/kg:	1.950	U	Slurry analysis, 1, mg/kg:	6.600				
	Slurry analysis, 2, mg/kg:	1.990	U						
	Avg., mg/kg	1.970		Avg., mg/kg	6.600				
	Total, mg:	1.400		Total, mg:	4.691				
	TCA, DRE, %	98.53%		Aroclor, DRE, %	89.04%				
	BEHP								
	Slurry analysis, 1, mg/kg:	33.800	B						
	Slurry analysis, 2, mg/kg:	17.700	B						
	Avg., mg/kg	25.750							
	Total, mg:	18.301							
	BEHP, DRE, %	89.00%							

S Kujawa
9/3/2003

Heat Balance

TEST RUN	**F-22**					
	Condenser Bath			Oil Bath		
	Set Point Temperature, Deg C	**5**		Set Point Temperature, Deg C	**100**	
	No heat balance data collected for run F-22.			The heat balance and heat generation calculations are very uncertain due to lack of physical properties for the heating oil. Efforts are being made to determine operating heat capacities and densities. STK 8/12/2003		
				Boss DS oil density, gm/ml	0.873	
				Boss DS oil heat cap. cal/gm/deg C	0.4	
10:45	Water Return Temp, Deg C			Oil Return Temp, Deg C		
	bucket ck volume, ml	**1000**		bucket ck volume, ml	**1000**	
	Bucket ck time, sec			Bucket ck time, sec		
	Flow rate, ml/min	#DIV/0!		Flow rate, ml/min	#DIV/0!	
	Enthalpy change, calorie/min:	#DIV/0!		Enthalpy change, calorie/min:	#DIV/0!	
	Flask Top Surface Temp., C			Flask bottom Surface Temp., C		
	Flask Top Surface Temp., F	32		Flask bottom Surface Temp., F	32	
	Air Temp. ,F			Air Temp. ,F	**0**	
	Overall HT coef. Btu/hr/F/sq ft	2.75		Overall HT coef.	2.75	
	Top flask Area, in^2	188		bottom flask Area, in^2	265	
	emisivity	0.94		emisivity	0.94	
	Convective Loss, cal/min	483		Convective Loss, cal/min	680	
	Radiative Loss, cal/min	122		Radiative Loss, cal/min	172	
	Flask top Heat Loss, cal/min	605		Flask bottom Heat Loss, cal/min	852	
	Reactor Temperature, C			P1 Gas Temp. Deg C.		
	Peroxide Temperature, F	0		Gas Flow Rate, gm/min		
	Peroxide Flow Rate, ml/min	**2**		Water Vap. gm/min	0.0000	
	Peroxide heat Cap, cal/gm/degC	0.8		P1 loss, H2O vapor, cal/min	0.00	
	Peroxide Enthalpy Change, cal/min	34.1				
				Accumulation/Generation, cal/min	#DIV/0!	

S Kujawa									
8/27/2003									
TEST RUN	**F-22**								
H2O2 TO O2	Residual H2O2 in flask								
gm	gm								
0.0									
1.0									
6.7									
18.8									
31.9									
45.6									
59.7									
74.0									
88.3									
102.0									
115.2									
128.0									
140.3									
153.1									
166.2									
179.4									
192.7									
206.0									
219.3									
232.4									
245.5	114.5								
258.6	101.4								
271.0	89.0								
282.0	78.0								
291.9	68.1								
300.5	59.5								
308.2	51.8								
315.4	44.6								
321.8	38.2								
327.2	32.8								
331.9	28.1								
336.1	23.9								
339.7	20.3								
342.9	17.1								
345.8	14.2								
348.3	11.7								
350.6	9.4								
352.6	7.4								
354.3	5.7								
355.8	4.2								
357.3	2.7								
358.7	1.3								
359.8	0.2								
360.8	-0.8								
361.6	-1.6								
362.4	-2.4								
363.1	-3.1								
363.8	-3.8								
364.4	-4.4								
364.9	-4.9								